

THE
AGRICULTURAL BULLETIN
OF THE
FEDERATED MALAY STATES.

No. 2.]

NOVEMBER, 1917.

[Vol. VI.]

INVESTIGATION ON SULPHUR IN VULCANIZED
RUBBER.

By B. J. EATON AND F. W. F. DAY.

THE following article, which contains the results of a preliminary investigation on the estimation of free and combined sulphur in vulcanized rubber, and the rate of combination of sulphur with different types of plantation Para rubber, was published in the *Journal of the Society of Chemical Industry*, Vol. XXXVI, No. 3, January, 1917. The summary, which was inadvertently omitted in the above publication, has since been added—*Ed.*

The many methods of estimation of sulphur by oxidation which involve the use of nitric acid, bromine, and alkaline fusion were tried and found unsatisfactory (*cf.* a paper by H. E. Potts in *The Rubber Industry*, 1911).

Rheinardt's proposed method * of burning the rubber in a current of oxygen and absorbing the resultant gases in brominated hydrochloric acid, fails to arrest *all* the sulphur compounds liberated. Gaunt (*Analyst*, 1915, 40, 9) suggests hydrogen peroxide as the absorbent and uses a short glass tube in place of the usual combustion "boat." He then titrates the sulphuric acid produced or weighs as barium sulphate.

Our experiments showed that the acidity could only be relied on when the combustion was complete. In practice, perfect combustion is difficult of attainment and this modification was abandoned. It was even found that, without the use of platinized asbestos, hydrogen peroxide allowed some escape of compounds containing sulphur, as also did strong solutions of barium peroxide in hydrochloric acid. Strong caustic soda, however, stopped *all* sulphur compounds without the use of platinized asbestos in the combustion

* *Pellier's Guide de l'acheteur de caoutchouc manufacturé*, 1912, p. 313.

tube, and on subsequent acidification with brominated hydrochloric acid the whole of the sulphur was recovered as barium sulphate. The type of combustion, i.e., whether "complete" or slightly smoky, has little effect on the results. Full working details of the new method are as follows:

The vulcanized rubbers are crumbed between small crepeing rollers and representative portions are selected for analysis. These in turn are carefully picked over under a lens for "skin," insufficiently crumbed particles, etc., and are finely snipped with scissors. 0.1374 gm. of each sample is wrapped up in little filter paper packets marked in pencil for identification later. These are stacked together in bundles of six or eight and extracted in a Clayton Beadle and Stevens' Soxhlet apparatus (*Analyst*, April, 1913) with boiling acetone. The extraction is carried on for about 100 hours and at suitable intervals the packets are opened, teased out with a finely pointed glass rod and forceps, and repacked. They are stacked again into bundles and subjected to further extraction. In the present work each sample was teased out in this way three times. On completing the extraction, the determination of sulphur should be carried out as soon as possible. It is found in practice that a more easily controlled combustion is obtained with the freshly extracted rubber than in the case of extracted samples that have been preserved for, say, a month. Furthermore, such samples ignite more easily and so dry distillation before ignition is reduced to a minimum.

The paper packet is pushed into a glass tube 3 cm. long $\times$ 1 cm. diameter, sealed at one end, and the whole placed in the combustion tube with the open end forward, and about 8 cm. from the forward end. The combustion tube is of hard glass and about 20 cm. long and 2 cm. in diameter. At the forward end it is drawn out and bent downwards to take a short piece of rubber tubing which connects it to the absorption apparatus.

This latter consists of two 15 cm. $\times$ 1.5 cm. test tubes, the first containing 1.5 c.c. and the second 0.2 c.c. of 7*N* aqueous sodium hydroxide. This strength is used as being the strongest that one can employ without fear of the leading tube jets being blocked by the carbonate formed during absorption.

As a safeguard against the necessity of having to rush through a quick current of oxygen, if the combustion becomes a little violent, it is advisable to attach a couple of small U-tubes filled with glass beads and moistened with a little 2*N* caustic soda to the absorption tubes.

Our practice here, as already pointed out, is to extract the samples in groups of six or eight, and to control the results by estimating the soluble sulphur dissolved out of the group by the acetone. It is convenient, therefore, for us to deal with the sulphur compounds absorbed by the U-tubes after the combustion of all the members of each group. Thus the barium sulphate so obtained is determined separately for each group. A group of six or eight members usually returns 0.5 to 2 mgrms. which is distributed evenly among the members of the group (see Table IV, under group correction).

To effect the combustion, which occupies ten to fifteen minutes, dry oxygen is passed slowly through the apparatus and a strong roaring flame is applied about 2 cm. in front of the mouth of the small tube. This is maintained until the paper packet begins to darken. To minimize the chance of a minor explosion spoiling the estimation, a strong current is now passed along the tube (up to 400 c.c. per minute) until ignition occurs. The current is then much reduced, and regulated so as to secure a small bright flame with as little smoke as possible.

When nothing but a whitish ash remains in the smaller tube, the test tubes and leading tubes are washed into a 200 c.c. beaker to which later are added the washings of the combustion apparatus obtained as follows: The large combustion tube is rinsed out with very dilute brominated hydrochloric acid and the small combustion tube is boiled in this mixture until all bromine is driven off. The liquid is then cooled and washed into the 200 c.c. beaker. The total bulk is now made up to 100 c.c. or over and 6 c.c. of brominated hydrochloric acid (pure acid 10 parts, water 10 parts, and bromine 1 part) added from a burette. The liquids are gently mixed with a glass rod, covered with a watch glass, and allowed to stand. After evaporating off the excess of bromine, filtering, and making up to 50 c.c., the sulphate in solution is precipitated by adding 2 c.c. of a 10 per cent. barium chloride solution. The filter paper and precipitates are burnt together in a muffle; there is no risk of reducing the sulphate to sulphide. All the filtrates from the first fifty-nine estimations in Table IV, were collected and mixed, and the recovered barium sulphate appears as a percentage of sulphur distributed among the samples in Table IV, column 6.

Each 0.01 grm. of barium sulphate represents 1 per cent. of sulphur in the rubber. The following figures (Table I) illustrate the constancy and accuracy of this combustion method.

An unvulcanized mixing (Slab rubber No. 221 S. 3, A), containing 90 per cent. of rubber and 10 per cent. of sulphur, was analysed, the samples being taken from different parts of the mixing.

TABLE I.

No.	Total sulphur on the mixing.
	%
1	9.81
2	9.82
3	9.76
4	9.85
5	9.79
6	9.81
Mean	9.81

After vulcanizing this mixing for 3 hours, which yielded a much overcured rubber, containing consequently a high percentage of combined sulphur, the same mixing yielded the results given in Table II.

TABLE II.

No.	Total sulphur on the mixing.
	%
1	9.80
2	9.93
3	9.89
4	9.91
5	9.98
6	9.81
Mean.	9.89

COMBINED SULPHUR (SULPHUR OF VULCANIZATION).

On extracting with acetone, the "free" sulphur is removed and the residue contains the "combined" sulphur.

As illustrating the constancy and accuracy of the acetone extraction process employed, followed by the combustion of the residual rubber as already described, the following duplicate figures serve. The results in Table III, below were obtained on the same sample (No. 221 S. 3, A) vulcanized for different periods.

DETERMINATION OF SULPHUR IN VULCANIZED RUBBER PREPARED FROM DIFFERENT TYPES OF PLANTATION PARA RUBBER.

In order to trace the combination of sulphur with samples of plantation Para rubber having different rates of cure, as indicated by the physical properties of the vulcanized material, a complete set of results arranged in three tables (IV, V, and VI), was obtained in the case of samples No. 244 A, B, and C, consisting of specimens of slab (244 A), sheet (244 B), and crêpe (244 C). All of these samples were prepared from similar latex and under identical conditions except as to machining.

TABLE III.

Number of hours vulcanized.	Combined sulphur per cent. on the mixing.	Type of combustion.	Combined sulphur per cent. on the mixing.	Type of combustion.
0	(Original.) 0.10	—	(Duplicate.) 0.15	—
$\frac{1}{4}$	1.73	Clean	1.82	Clean
$\frac{1}{2}$	2.44	Slow, smoky	2.51	Combustion rapid at start
$\frac{3}{4}$	3.06	Slow start; normal otherwise	2.93	Clean start, later very rapid
1	4.18	Unexpected start; rapid; much smoke	3.96	Clean, quick combustion
$1\frac{1}{4}$	4.38	Very badly smoked	4.38	Clean, trifle dry distilled at start
2	6.42	Rapid start, normal later	6.38	Rapid start; very slow later

(NOTE.—The optimum cure of this sample was taken to be 1 hour 8 min., which corresponds to 4.22 per cent. combined sulphur.)

TABLE IV—(cont.)

Results of analysis of the "residual sulphur" arranged in the groups as extracted and showing the application of the two corrections—(cont.)

Group No.	Reference No.	Hours vulcanized.	Percentage of sulphur.	Additional percentage of sulphur recovered from		Final experimental figure.	Group total, barium sulphate.
				Group.	Filtrate.		
4	244 C	$\frac{1}{2}$	0.72	0.02	0.03	0.77	0.1288 gm.
	244 C	1	1.32	0.01	0.03	1.36	
	244 C	$1\frac{1}{2}$	1.60	0.01	0.02	1.63	
	244 C	1	1.81	0.01	0.02	1.84	
	244 C	1	2.15	0.01	0.02	2.18	
	244 C	2	2.75	0.01	0.02	2.78	
	244 B	$1\frac{1}{2}$	2.29	0.01	0.02	2.32	
	244 B	1	1.70	0.01	0.03	1.74	
	244 B	$1\frac{1}{2}$	1.96	0.01	0.03	2.00	
	244 C	2	2.41	0.02	0.02	2.45	
5	244 C	2	2.96	0.02	0.02	3.00	0.2026 gm.
	244 C	2	3.23	0.02	0.02	3.27	
	244 C	3	3.71	0.02	0.02	3.75	
	244 C	3	4.01	0.02	0.02	4.05	
	244 A	$1\frac{1}{2}$	5.02	0.01	0.03	5.06	
	244 A	1	4.40	0.01	0.03	4.44	
	244 A	1	3.59	0.02	0.02	3.63	
	244 A	1	2.88	0.01	0.02	2.91	
	244 B	$\frac{1}{2}$	1.12	0.01	0.02	1.15	
	244 C	$\frac{1}{2}$	0.94	0.01	0.02	0.97	
6	244 C	$\frac{1}{2}$	0.72	0.02	0.03	0.77	0.1816 gm.
	244 C	1	1.32	0.01	0.03	1.36	
	244 C	$1\frac{1}{2}$	1.60	0.01	0.02	1.63	
	244 C	1	1.81	0.01	0.02	1.84	
	244 C	1	2.15	0.01	0.02	2.18	
	244 C	2	2.75	0.01	0.02	2.78	
	244 B	$1\frac{1}{2}$	2.29	0.01	0.02	2.32	
	244 B	1	1.70	0.01	0.03	1.74	
	244 B	$1\frac{1}{2}$	1.96	0.01	0.03	2.00	
	244 C	2	2.41	0.02	0.02	2.45	

TABLE IV—(cont.)
Results of analysis of the "residual sulphur" arranged in the groups as extracted and showing the application of the two corrections—(cont.)

Group No.	Reference No.	Hours vulcanized.	Percentage of sulphur.	Additional percentage of sulphur recovered from		Final experimental figure.	Group total, barium sulphate.
				Group.	Filtrate.		
7	244 A	6	9.46	0.02	0.03	9.51	0.4795 grm.
	244 A	5	9.49	0.02	0.03	9.54	
	244 B	6	8.12	0.02	0.02	8.16	
	244 B	5	7.27	0.03	0.02	7.32	
	244 C	6	7.28	0.02	0.02	7.32	
	244 C	5	6.05	0.03	0.02	6.10	
8	244 C	3 $\frac{1}{2}$	4.86	0.01	0.03	4.90	0.3964 grm.
	244 C	4	4.97	0.02	0.03	5.02	
	244 B	3 $\frac{1}{2}$	5.70	0.02	0.02	5.74	
	244 B	4	5.92	0.02	0.02	5.96	
	244 A	3 $\frac{1}{2}$	8.87	0.02	0.02	8.91	
	244 A	4	9.07	0.02	0.02	9.11	
9	244 A	4 $\frac{1}{2}$	9.13	0.02	0.03	9.18	0.3979 grm.
	244 B	4	6.55	0.03	0.03	6.61	
	244 C	4	5.53	0.02	0.02	5.57	
	244 A	3	8.69	0.02	0.02	8.73	
	244 B	3 $\frac{1}{2}$	5.28	0.02	0.02	5.32	
	244 C	3	4.33	0.03	0.02	4.38	
10	244 A	7	9.52	0.01	0.03	9.56	0.3849 grm.
	244 A	8	9.79	0.01	0.02	9.82	
	244 C	9	9.45	0.01	0.02	9.48	
	244 C	10	9.60	0.01	0.02	9.63	

TABLE V.

Results of estimation of the "soluble sulphur" extracted from the various groups; and the balance between this sulphur and the residual sulphurs of table IV.

Group No.	Grammes of BaSO ₄ (less blanks).		Total BaSO ₄ grammes.	Total sulphur in group. %
	Soluble.	Combined.		
1	0.4241	0.2602	0.6843	9.78
2	0.3414	0.3478	0.6892	9.85
3	0.4153	0.2742	0.6895	9.85
4	0.5561	0.1288	0.6849	9.78
5	0.4899	0.2026	0.6925	9.89
6	0.4024	0.1816	0.5840	9.73
7	0.1077	0.4795	0.5872	9.79
8	0.1960	0.3964	0.5924	9.87
9	0.1930	0.3979	0.5909	9.85
10	0.0130	0.3849	0.3979	9.95

METHOD OF ESTIMATION OF SOLUBLE SULPHUR.

The acetone extract of each group was dried, treated under a reflux condenser with nitric acid and bromine mixture, evaporated to dryness with a little potassium nitrate, mixed with potassium chlorate (1 part) and fusion mixture (6 parts), ignited in a nickel dish, the aqueous extract filtered, acidified with hydrochloric acid, boiled to remove carbon dioxide, diluted to half a litre, and precipitated with 10 c.c. of 10 per cent. barium chloride.

Table V, shows the amount of "soluble sulphur" weighed as barium sulphate obtained from each group. As will be seen, the estimation of the soluble sulphur in this manner acts as a check on the operations, and the figures in the last column show that practically all the sulphur is accounted for.

In Table VI, the results are rearranged for each of the specimens 244 A, B, and C, in order to show the combination of sulphur with progressive periods of heating.

DIAGRAM I.

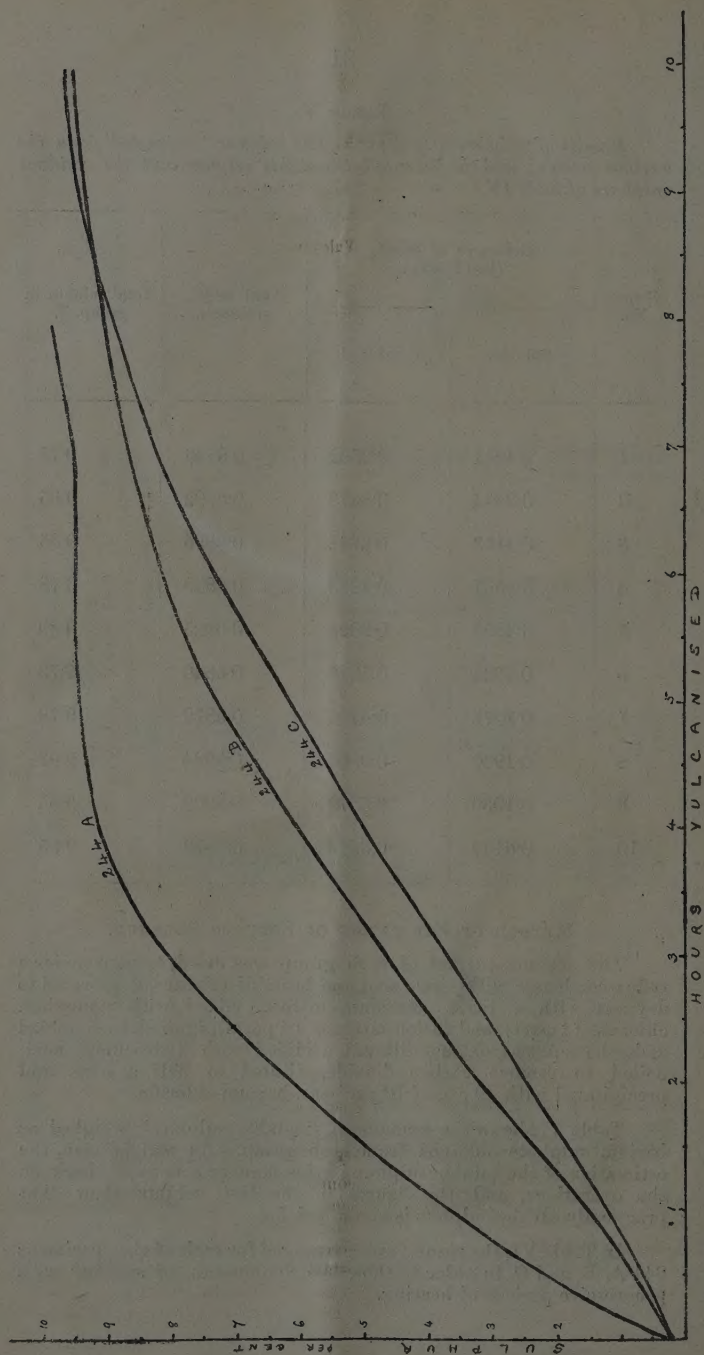


TABLE VI.

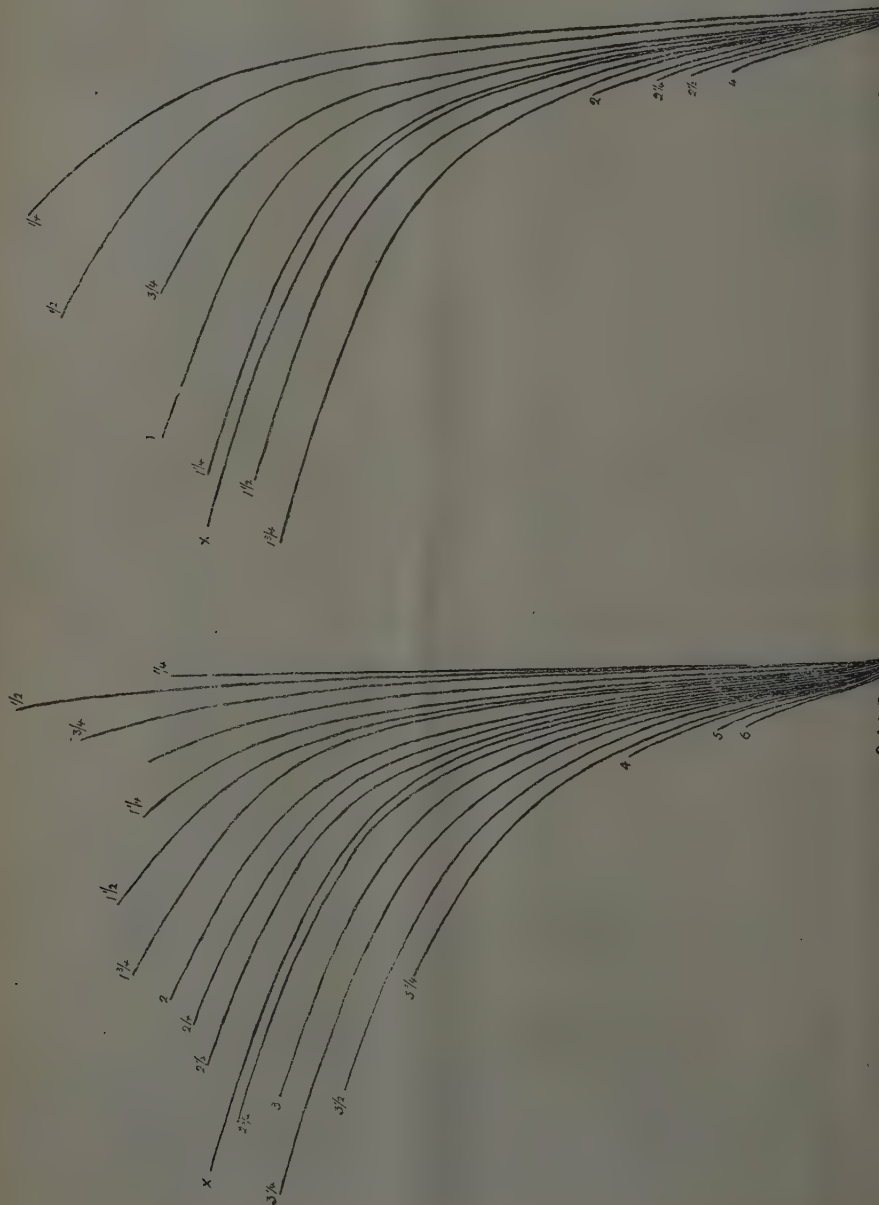
No. of hours vulcanized.	Percentage of combined sulphur on the mixing.		
	Vulcanized slab rubber, No. 244 A.	Vulcanized sheet rubber, No. 244 B.	Vulcanized crêpe rubber, No. 244 C.
0	0.29	0.26	0.30
$\frac{1}{4}$	1.29	0.51	0.43
$\frac{1}{2}$	2.22	0.78	0.77
$\frac{3}{4}$	2.91	1.15	0.97
1	3.63	1.74	1.36
$1\frac{1}{4}$	4.44	2.00	1.63
$1\frac{1}{2}$	5.06	2.32	1.84
$1\frac{3}{4}$	5.47	2.77	2.18
2	6.19	3.26	2.45
$2\frac{1}{4}$	6.96	3.54	2.78
$2\frac{1}{2}$	7.22	3.93	3.00
$2\frac{3}{4}$	7.54	4.26	3.27
3	8.03	4.68	3.75
$3\frac{1}{4}$	8.48	4.98	4.05
$3\frac{1}{2}$	8.73	5.32	4.38
$3\frac{3}{4}$	8.91	5.74	4.90
4	9.11	5.96	5.02
$4\frac{1}{2}$	9.18	6.61	5.57
5	9.54	7.32	6.10
6	9.51	8.16	7.32
7	9.56	8.71	8.30
8	9.82	9.06	8.87
9	...	9.28	9.48
10	...	9.55	9.63

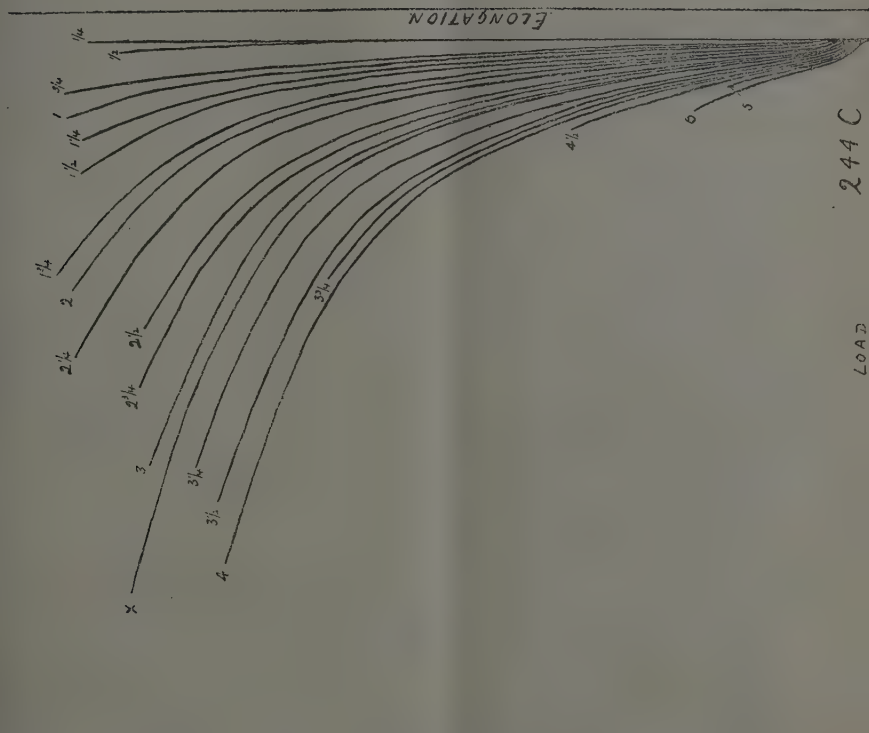
It will be seen from Table VI, and Diagram I, that the figures give smooth curves up to seven hours for the slab (244 A), and ten hours for the sheet (244 B) and crêpe (244 C).

PHYSICAL PROPERTIES OF THE VULCANIZED RUBBERS.

In order to compare the rate of combination of the sulphur in the case of each type of rubber, with the tensile properties of the vulcanized material, we include the following diagrams (Diagrams II and III) of the load-stretch curves for the different periods of cure at $\frac{1}{4}$ hour intervals, in which the progressive state of cure of the samples as judged by their tensile properties can be seen at a glance. The curve marked X in each case is the curve of optimum time of cure

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as estimated by our standard curve method (*vide Jour. Soc. Chem. Industry*, 1916, 35, page 715-728, "Vulcanization experiments on plantation Para rubber. II. The cause of variability and some contributory factors," by B. J. Eaton and J. Grantham) but, as we have stated elsewhere, the standard curve obtained at this "optimum cure" may not be strictly correct, although it constitutes a good basis of comparison between different rubbers, since it is relative rather than absolute. It represents, however, a similar state of cure in each sample.

If some other standard curve were selected, similar relative results would be obtained. This can easily be demonstrated by plotting from the same point any three curves for each type obtained at a particular time of cure.

The optimum times of cure, indicated by the standard curve method, as shown in Diagrams II and III are given in the table below (Table VII) together with the optimum times of cure obtained from the maximum product figure (*loc. cit.*)

TABLE VII.

Reference No.	Optimum time of cure from standard curve. Hours.	Optimum time of cure from maximum product. Hours.
244 A	$1\frac{1}{4}$ — $1\frac{1}{2}$	$1\frac{1}{2}$
244 B	$2\frac{1}{2}$ — $2\frac{3}{4}$	$2\frac{1}{2}$ — $2\frac{3}{4}$
244 C	3— $3\frac{1}{4}$	$3\frac{1}{4}$

Dealing with these curves it may be said that the different rates at which the three samples combine with sulphur are in accordance with their different rates of cure as determined by their physical properties in the load-stretch curves; and the samples represent plantation para rubbers of extreme and medium rates of cure prepared by acetic acid coagulation. Thus not only do the combined sulphur contents agree at optimum times of cure, but coincident load-stretch curves of the three types at different times of cure have the same combined sulphur content.

It will be seen that in the main these results agree with the researches of Spence and Young (*Kolloid Zeitschrift*, Vol. XI, July, 1912), thus disposing of the theory of irregularity in the rate of vulcanization under given conditions as advanced by Weber. The percentage of combined sulphur at the optimum time of cure is practically the same for all three types, and, so far as we have results, this percentage of sulphur at the optimum time of cure, according to our method, is always about 4 per cent. to 4.5 per cent., calculated on the mixing, for our particular mixings (90 per cent. rubber and 10 per cent. sulphur). Whether this will be so for all samples remains to be seen. Further, it is important to note that by the use of this method of estimating the sulphur in vulcanized rubber we find no important unaccountable loss—14 to 15 per cent.—as Spence and Young (*loc. cit.*) and other experimenters have found.

The small deficiencies in our experiments averaging 0.2 per cent. only are attributed to small losses during the mechanical processes in mixing, which up to the present have not been traced, to slight increases in weight such as are sometimes observed after mixing, and to the addition of French chalk to the surface of the mixings. It is possible also that some sulphur remains combined in the insoluble ash obtained on combustion. Some slight loss is unavoidable also in the process of teasing out the residues during the acetone extraction.

We are thus able to balance the free sulphur and the combined sulphur against the total sulphur and against the original sulphur put into the mixing, as is shown in Table V.

SUMMARY.

In connection with a statement made by one of us (B. J. E.) in the *Agricultural Bulletin, F.M.S.*, Vol. III, Nos. 6-7, March-April, 1915, which was as follows: "Whether it will be found that the amount of combined sulphur at the correct rate of cure is more or less constant, like the mechanical properties, remains to be seen and we propose to ascertain this shortly" Schidrowitz has published the results from nine samples which show that he finds no relationship between the "optimum cure" and the percentage of combined sulphur. (*Vide India Rubber Journal*, Vol. LI, April 8, p. 505.)

While the figures given in our paper do show a relationship, the samples investigated, which differ widely in rate of cure, are insufficient to enable us to make a more definite statement at present and we propose to investigate further samples of widely varying rates of cure for periods which give the standard load-stretch curve, used in our method of comparing the rates of cure of different rubbers. We should like to state here, however, that it appears probable that a relationship will exist when the caoutchouc is unchanged. If, however, the caoutchouc has undergone any degradation produced by physical means (*e.g.* heat) or by chemical action, so that we are not dealing with caoutchouc only, it is possible that no direct relationship will be found between the rate of combination of sulphur and the rate of cure of such a rubber when compared with a normal sample. This possibility, however, obtains no support from the description of the samples, the tensile properties or the type of curve as set out in the paper to which reference is made. On the contrary the samples appear to be typical specimens. The published figures with regard to combined sulphur at present available are insufficient to allow of any definite conclusions being drawn.

We propose therefore, to continue the investigation on samples, similar to those examined in this paper, with lower proportions of sulphur, especially mixings containing about 5 per cent. of sulphur, which, as we have shown in a paper already in press (*Jour. Soc. Chem. Industry*, Vol. XXXV, No. 20, 1916) do not show the marked overcures which are obtained when using a mixing containing 10 per cent. of sulphur on the mixing. It is proposed also to investigate further the effect of very prolonged curing on similar samples.

MEMORANDUM RECOMMENDING CLEAN CLEARING OF RUBBER ESTATES IN MALAYA.

By A. SHARPLES AND W. N. C. BELGRAVE.

(The following notes were distributed to Planters as a Memorandum.)

THE recommendations made in the following article are the outcome of the work carried out in the Mycological laboratory of the Department of Agriculture, F.M.S., during 1915-1916. The conclusions of the scientific officers were placed before an Advisory Committee which sits quarterly and is composed of 15 prominent planters and the departmental officers more closely connected with pest and disease work. The deliberations of this committee are embodied in the present article; every effort has been made to draw the scientific conclusions into line with estate practice. The result is a general scheme of treatment for pests and diseases which attack the roots of rubber trees. Such a scheme could not be put forward previously with an assurance that the money spent on routine disease treatment would be amply compensated. This assurance can now be given.

The researches mentioned above concern chiefly two fungi which cause diseases of the roots in old trees, viz.: (a) *Poria hypolaterita* and (b) *Ustulina zonata*.

(a).—*Poria hypolaterita*.

This fungus has been found in all parts of the Peninsula and is spread on the plantations entirely by contact of healthy with diseased roots, which may be those either of rubber or jungle trees. There is no spore infection, hence the content of *P. hypolaterita* on a plantation depends on the amount present when the trees were planted and on the subsequent treatment and on these two factors only. From this it follows that if the fungus be eliminated before planting, the estate will be immune from attacks by it. This elimination can be assured by clearing an estate of all jungle stumps and timber before planting.

Objections against this course may be urged because:

- (i) The amount of *P. hypolaterita* in jungle at any given time is small, hence the chances of infection of large numbers of rubber trees are also small;
- (ii) The fungus is known to advance very slowly in living tissue and (with one exception) no plantation has lost an appreciable number of trees with *P. hypolaterita* before eight years; therefore no great harm will be done by deferring clean clearing;
- (iii) Clean clearing before planting entails a large expenditure at the time estates can least afford it.

These objections lose sight of some of the important points with regard to *P. hypolaterita*, viz.: that while of slow growth on living tissue, it is capable of very rapid growth in decaying wood.

Once jungle is felled the roots begin to decay and the fungus content immediately and rapidly rises, greatly increasing the chances of infection. Further, the slowness of attack on living trees constitutes the real menace from *P. hypolaterita*, because many trees may be badly infected by the fungus and yet look perfectly healthy. These are left in at the time of thinning out and dying, perhaps five years later, leave serious gaps on the plantation.

(b).—*Ustilina zonata*.

(1) The fructifications of the fungus are found on old jungle stumps and logs left in the plantations after burning. This is one of the sources from which the fungus starts.

(2) *U. zonata* is one of the commonest fungi growing in and causing the rotting of soft wood timber; rubber wood is very suitable. Thus when thinning out is undertaken a large amount of suitable food material for the fungus is supplied, if the logs and stumps are left lying on the ground.

In the main the above remarks apply to *U. zonata*. The greatest difference lies in the fact, that the fungus produces a multitude of spores. These are largely wind borne, but insects may carry them about the plantation. Any soft wood timber; such as logs or stumps of rubber left lying in the plantation after thinning out, form a suitable nidus, so that even if clearing is deferred it is essential that it should be undertaken before or at the time of thinning out.

After consideration of all the facts, whenever the money is freely available and complete clean clearing can be undertaken, it is strongly to be advocated from the point of view of eliminating diseases from the plantations. When clean clearing is impossible, a compromise should be adopted by which all the smaller and easily removed stumps and roots are cleared before or soon after planting and the larger stumps trenched. These large stumps when sound and undecayed are extremely difficult to remove but the cost of trenching is negligible when compared with that of removal. The trenches should be six feet away from the stumps and deep enough to cut through the laterals, the parts of which outside the trench should be taken up. No trees are to be planted within these trenches and further all trenches must be kept open as long as the stump remains, to prevent laterals of adjacent *Hevea* trees growing in towards it. Later at the time of thinning out, the stumps will have decayed enough greatly to facilitate removal.

Clearing work for prevention of disease should be undertaken as a matter of estate routine. As soon as possible after the burn the smaller stumps should be extracted and trenches should be carried around the larger ones as advised. The clearing of the surface timber may, with safety, be a more prolonged operation, but the estate should be clean at the time of the first thinning. Adoption of the above measures will prevent losses of large numbers of old trees owing to attacks of root fungi. Previous to researches on *U. zonata* and *P. hypolaterita*, the only root troubles supposed to be responsible for losses on rubber estates were those caused by *Fomes lignosus* and White ants. Both of these are responsible for serious losses in the early stages of some estates, but neither is

generally distributed, so that the treatment to be recommended in either case could only be locally applied. The cleaning methods recommended above would prevent many losses from "*Fomes* and White ants," for the treatment recommended for these troubles is clearing of timber and extraction of stumps, but the effective remedy to the early troubles is the planting of sufficient trees to the acre to compensate for losses in the first few years. After the trees reach a certain age this remedy is ineffective for crowding must be prevented in order to obtain a good bark renewal. Thus, thinning out must be undertaken sooner or later. These thinning out periods are important marks in the life-history of a plantation, and unless precautions are taken, a sudden impetus is given to the rate of spread of the fungi causing root-rots on old trees.

The rapid spread of *U. zonata* can be largely controlled by clearing before the time of the first thinning. To prevent the spread of *P. hypolaterita* earlier operations are necessary, but if rubber stumps are left in the ground, the fungus can spread much more rapidly at the time of thinning out. The golden rule should be "That the estate should be absolutely clean at the time of the first thinning out."

Further support for a policy of thorough clearing is derived from facts relating to "bark diseases" which have been gleaned during the last 12 months. There is a great danger of "bark diseases" becoming epidemic in Malaya, especially on the closely planted estates. Up-to-date serious attacks of "bark disease" have only been met with in two localities and in one of them, it is obvious that overcrowding was responsible for the start and rapid spread over a large area. If those bark diseases become general, and all reason and experience leads to this conclusion, drastic thinning out will have to be resorted to and the time is rapidly approaching, when estates will reach the irreducible minimum of trees per acre, when losses owing to root diseases cannot be made good. When this happens, the benefits derived from foresight and effective administration and supervision will be fully realized.

METHOD OF CLEARING.

The scheme of clean clearing may be outlined as follows:

- (a) Trenching of large stumps and, eradication of small stumps before or immediately after planting up;
- (b) Clearing of surface timber to be gradually undertaken up to the time of the first thinning out;
- (c) The surface timber to be thoroughly cleared, along with the rubber stumps and logs at the time of the first thinning out.

COST OF CLEARING.

Figures compiled by two of the planting members of the committee are as follows. In these figures two degrees of clean clearing are understood:

- (1) Taking off all surface timber and stumping to a depth of 18 inches.
- (2) Removing all timber to a depth of 18 inches.

Under the first condition it is estimated that with the different types of jungle and land ordinarily met with in Malaya the cost would be :

- (a) For heavy jungle, bukit land and large percentage of hardwood timber—cost per acre, \$125-\$175;
- (b) For medium jungle, \$85-\$125.

For removing all timber to a depth of 18 inches :

- (a) For heavy jungle as above, \$210-\$260;
- (b) For medium „ „ \$170-\$210.

Such expense is prohibitive; clean clearing operations could not be contemplated as a practical scheme even at the lowest figure mentioned. But other figures are available showing the cost of clearing as advised by us. These figures were obtained during an attempt to control a very serious attack of *Fomes lignosus* on a heavily timbered estate with hilly land. This estate was situated in a district where labour conditions were not favourable, which raised the cost of the operations. On this estate, three years old, a combined system of clearing and trenching was advised—all the larger jungle stumps were trenched—the smaller ones jacked out, the timber sawn up and burnt—while the areas inside the *Fomes* isolation trenches were heavily limed and deeply changkolled.

The costs were as follows :

For clearing and stumping,	\$28.03
„ trenching	\$5.00

This estate was inspected recently and the treated areas showed few traces of *Fomes*. A very noticeable feature was the extraordinary growth of the trees over the treated areas when compared with those over non-treated. The liming and deep changkolling was, without doubt, largely responsible for this and any clearing operations taken about the age of three years could be carried out to similar results. The wood-ashes from the burning could be scattered along with a little lime and dug in with undoubtedly beneficial results.

COCONUT CULTURE.

BY G. E. COOMBS AND F. H. DALE.

(1).—OBSERVATIONS ON THE USE OF LEGUMINOUS COVER CROPS.

THE considerations which have led to the utilization of cover-plants in estate practice are those concerned with weeding costs, with the different mechanical effects on different types of soil, with their mulch values, and in the case of leguminous crops with their manurial values as nitrogen providers. Of these considerations the one of greatest importance from the point of view of the young coconut estate is that concerned with weeding costs, but though the utilization of cover crops has been much extended during the past few years there are as yet few data as will permit of an accurate assessment of their values, and it is freely acknowledged that decisions as to their being used are largely matters of personal judgment or are, in the case of leguminous crops, based on the ground of theoretical arguments which may be advanced concerning their mode of nutrition. Whatever be the theoretical claims there is the urgent need for substantiation or otherwise, and in this particular field there is tremendous scope for the investigator since the field is practically untouched and conditions are of such peculiarly interesting nature. Hitherto sufficient consideration has not been given to the possibility of obtaining results of utility from experiments carried out on a small scale. In this respect the case of leguminous crops calls for particular attention.

Since the classical work of Hellriegel and Willfarth in 1886, the utilization of leguminous crops as means of enriching the nitrogen content of soils has developed apace, but there is little doubt that it has been much too frequently assumed that under all conditions where leguminous crops are found to thrive, their mere growth actually connotes nitrogen fixation. Leguminous plants, however, obtain the nitrogen which they require in two ways,¹ these varying with the conditions in which the plants find themselves. Ordinarily, they "fix" the nitrogen from the air in the soil through the agency of the bacteria in the nodules which develop on their roots. On land rich in nitrates, however, they are able to utilize their nitrates exclusively.

These observations are of interest concerning the occurrence of patches of well-thriving crops of leguminous plants which have recently come under our observation, e.g., *Tephrosia candida*, *Centrosema plumieri*, *Dolichos Hosei* and *Canavalia ensiformis* whose root systems have been practically devoid of nodule development. This absence of nodule formation may be accounted for as follows: It may be that the soils in which the legumes are growing are actually devoid of or very deficient in the necessary bacteria, for it is known that when the introduction of leguminous crops is extended to new areas which have hitherto not produced them, actual inoculation of the soil is often necessary. It may, also be,

¹ Agricultural Research Institute, Pusa. *Bulletin No. 67* of 1916.

that conditions of soil acidity are inimical to their functioning, or it may be that the leguminous plants are functioning as normal green plants function in their mode of obtaining nitrogen, namely by the absorption of nitrates. The question of nitrate production under conditions obtaining in the tropics is a matter which requires investigation but whatever be the actual state of affairs it is certain that absence of nodules definitely connotes absence of nitrogen-fixation by the organism associated with leguminous crops, and a word of caution is needed ere it may be assumed that this soil or that will become the richer in nitrogen because it is cropped with a leguminous cover.

Some interesting observations have recently been made on Tumbuk Estate, Selangor, concerning this question. Two pieces of land Nos. 4 and 5 carrying palms planted February, 1912, were chosen. One piece No. 4 carried an extremely heavy growth of *Tephrosia candida*—a growth comparing very favourably with any of the estate while No. 5 had no *Tephrosia*. Soil samples of each were taken by the Assistant Agricultural Chemist, for mechanical and chemical analysis and the following results obtained by him:

MECHANICAL ANALYSIS.

	No. 4.	No. 5.
	Per cent.	Per cent.
Coarse sand	6.0	4.3
Fine sand	14.5	13.8
Coarse silt	16.7	16.6
Fine silt	16.0	14.5
Clay	26.5	27.1
Moisture	5.8	6.7
Loss on ignition = organic matter		
+ combined water	13.0	15.6
Loss during analysis	1.5	1.4

CHEMICAL ANALYSIS.

	No. 4.	No. 5.
	Per cent.	Per cent.
Insoluble in Hydrochloric acid	71	66
Total Potash	.570	.464
Total Phosphate	.114	.120
Total Nitrogen	.344	.400
Lime absorption	.376	.405
Lime absorption in tons per acre	5	5.5

These figures show the comparable natures of the soils as judged by their mechanical analyses. As concerns their chemical analyses it may be argued that No. 4 contained less nitrogen initially, for it is seen that the potash figures show slight variation but there seems little doubt that it is permissible to conclude that this crop of *Tephrosia candida* of 2½ years standing, prunings of which had been

repeatedly used as a mulch had not enriched the soil of its nitrogen content by any appreciable amount. There was much less nodule development in the *Tephrosia* roots of Block 4 than in the lighter soiled areas of the estate though the cover itself compared very favourably with any of the rest, and it appears that the plant had functioned in the ordinary manner of the green plant, not adding any nitrogen to the soil but taking that already present in the ground to produce its own tissue.

It is unfortunate that no analyses of the different parts of the plant were made but figures detailing such analyses are quoted¹ as showing that every 1,000 lbs. of green prunings of the plant provides the equivalent in nitrogen, phosphoric acid and potash of about 400 lbs. of castor cake, 10 lbs. of bone meal and 10 lbs. of sulphate of potash respectively. Whether in arriving at these figures the question of the availabilities of the various elements in the forms so compared was considered is not disclosed. But the question which has to be decided in an attempt to appraise the value of the plant is, whence and in what manner is its nitrogen absorption effected. This question is but part of the extremely interesting biological problem relating to the absorption of nitrogen under conditions prevailing in the tropics. The ordinary and almost general acidic nature of tropical soils militates against the biological processes of nitrification, whereby organic nitrogen is converted by oxidation into available nitrates²; the same adverse factor functions similarly in preventing the action of the nitrogen fixing organisms of the leguminous plants. What then are the biological processes which actually go on? There is a wide field for work on leguminous crops as mentioned previously, and this work may find its most useful development, not in attempts to measure actual crop increases, for these are dependent on a variety of causes³ but in biological and chemical studies of soils of various types possessed of and without leguminous crops.

As concerns the case of the particular leguminous plant under consideration its claim to a place in the group of cover-plants as suitable for use in young coconut clearings most certainly lies in its possible manurial value. Considered as a cover-plant only, it is costly to keep cut down level, an operation required to make it branch freely to produce its most dense cover; it is very woody once well established and very difficult for coolies to weed under; it demands the closest of supervision to ensure that lalang does not get in and even the best of supervision will often not detect this until it is well established, but the point of interest which emerges by virtue of its being a leguminous plant is whether the good effect it produces as a mulch is largely due to the high manurial value, and whence the manurial value has originated, or whether it may not be very largely ascribed to the actual digging up and aeration of the soil—a far less costly process. In the case of a soil of the type for which the analyses are quoted it seems conclusive that its value may be very much over-rated.

¹ Munro and Brown. *A Practical Guide to Coconut Planting*, p. 73.

² Hall. *The Soil*, p. 194.

³ *Agricultural Bulletin*, F.M.S., Vol. V, No. 10, pp. 381-388.

(2).—MOUNDING AND BEVELLING.

The point in coconut culture which predominates in importance above all others is that of drainage. Over and above the deep main-drainage system, some method has to be evolved to deal with surface water and the prevention of the formation of stagnant pools which are invariably inimical to the growth of the coconut palm. Further, in the case of clean-weeded estates, surface drainage has to be carried still further if the rapid growth of weeds is to be prevented. Weed growth possibly above all other factors can to the practiced eye convey accurate information concerning drainage conditions. In some cases we find the conditions of high water table and general logging responsible for the growth of definite associations of water-loving plants whose absolute exit may be procured by drying off the ground. In other cases we find surface drainage so poorly provided for that every wet period sends weeding costs up disproportionately.

Most of the coconut soils in this country are of the nature of clayey loams overlying heavy clay and under these conditions, even with the finest system of main drains, surface drainage is far from ideal. Percolation is often exceedingly slow.

It is the practice on soils of this nature to mound three year old palms—palms which show well-developed woody boles—with earth taken from the main drains or with earth taken from between the rows of palms. The value of this operation seems to be manifold. It counteracts the effects of consolidation of the now well drained ground with its consequent shrinkage and exposure of the bases of the boles. This effect on different types of soil may be very great.¹ It provides a feeding medium for the many roots which are produced from the bases of the boles and assists in keeping the trunk straight. It accelerates the removal of water from the immediate bases of the trees and distributes the same to the now wider-ranging feeding roots, but in cases where it is done to perfection, where the earth used in the mounding is not of the nature of sticky impenetrable clay, its tonic effect seems to be in the seepage possibilities it sets up and this latter may explain the outstanding growth visible on all palms lining the main drains. Here water with its dissolved food material and its oxygen are in more vigorous circulation than in any other part of the estate. But mounding as such, and it is generally circular mounding which is recommended, is a troublesome operation in estate practice, and however well done is apt to result in irregular depressions where water collects and does harm.

“From the commencement it should be realized that nothing in the shape of a hollow or depression should be allowed to remain within a certain radius of the stem of the tree.”²

The operation has been modified to a form of long mound in Tumbuk Estate, produced as follows:

The 2½ years old crop of *Tephrosia candida* in the stand of 3½ years old palms is cut down, its roots forked out and burnt in heaps with undecayed timber, leaf-fronds, etc., the

¹ Munro and Brown. *A Practical Guide to Coconut Planting*, p. 147.

² *Loc. cit.*, p. 46.

resultant ash being spread over the ground. This initial cleaning is a very thorough one all wood being burnt, the grubs of beetles and colonies of white ants being destroyed. After this a shallow trench 9 inches in depth and 18 inches broad is dug as shown in Figure 1, the earth so excavated being thrown on to the areas on either side, *e.g.*, A', B', X', Y' the line X' Y' having been previously demarcated with a changkol. The care with which this line is made largely determines the regularity of the mound.

The subsequent operation consists in bevelling the shelf of the trench as shown in Figures 2 and 3. Figure 4 shows the result viewed from an angle. This method ensures a very efficient means of getting rid of surface water, shallow mounding is effected thereby, and the two operations thus combined. The initial cost of the method may be obtained from the fact that one cooly can do an area twice the size of A', B', C', and D', *i.e.*, two full palms per day.

The subsequent weeding over a period of three months is higher, as the seed gets stirred up, but later on the costs are much reduced. At the present stage of this particular estate the operation seems a great success but it may be argued that the same efficiency in ridding surface water would result from a deepening of all the main drains. But even if these are less than 5 chains apart and a system of this nature would be extremely costly, deepening below that depth of the outlet drains which in coconut land is never more than 4-5 feet deep, would be of no utility since these would be standing water as a result.

There is no doubt that the operation would not be equally effective on other estates of different soil types, for in some types the wash effect would be very great and result in an accumulation of all the finer particles in these surface drains but even here subsequent manipulation of the drains so filled up would not be a matter of difficulty. It would be in consideration of cultivation treatments to be applied subsequently where the major difficulties to maintain the system would lie.

Fig. 4.

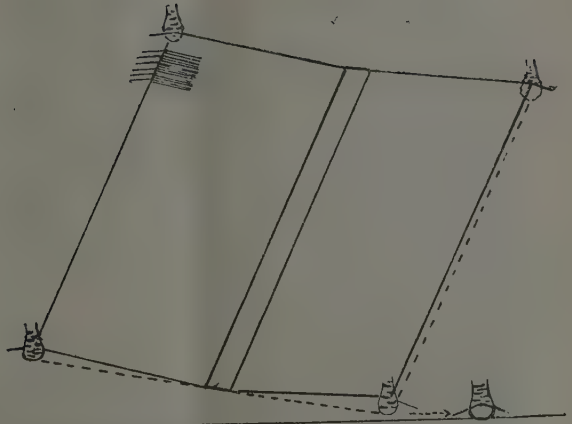


Fig. 3.

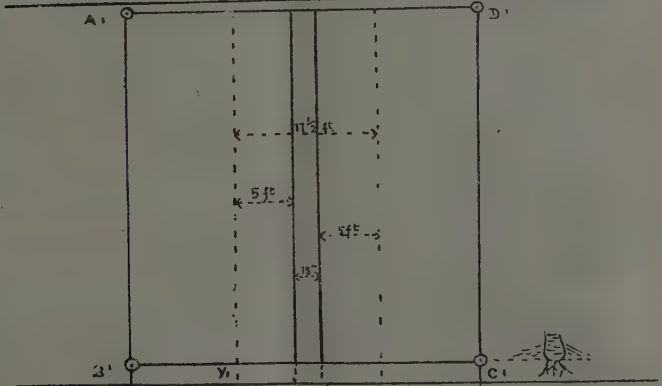


Fig. 2.



Fig. 1.



A NATIVE METHOD OF PLANT PROPAGATION.

By D. H. GRIST.

PROBABLY nobody would be prepared to admit that the Malay is particularly careful in his methods of cultivation, and even less so in his methods of plant propagation. With a few exceptions plants are never raised from cuttings, but full use is made of seeds and suckers. One noteworthy exception to the casual methods employed, is a system of raising stock by the inducement of adventitious roots. This method, called "tut" in the Malay language, is often described as grafting, but that is not an accurate translation. The method of "tut" is especially used in raising new stock of chiku plants, and is sometimes used with limes, mangos, and occasionally other fruits. Local opinion differs as to its advantages and success when used in producing other fruits, but with chikus its success is undoubted.

The method consists of "ringing" a branch, covering up the ringed portion till adventitious roots appear, and then cutting off below the ringed portion for transplantation. The operations are as follows :

A branch, about three feet long and three-quarters of an inch at its greatest diameter is ringed with a sharp knife in two places one inch apart, and the bark from the ringed portion removed. This portion is covered with coconut husk mixed with soil. Occasionally a half coconut shell is used, a slit being cut to the centre to admit the branch, and one of the holes of the shell being slightly enlarged to hold the branch when in position. The shell then rests on the branch about three inches from the cut portion. The shell is filled with rich soil, well pressed down and kept moist. When husk is employed, the ringed portion is covered with husk and soil till the diameter of husk is about six inches. The husk is tightly bound to the branch and kept moist. Sometimes a tin with a small hole in the bottom is filled with water and suspended over the "tut," to ensure a steady supply of water; otherwise, and more frequently, the "tut" is watered once or twice a day. In favourable circumstances, roots will show through the fibre in two or three months. If the new plant is now severed from the parent and planted, a proportion of these will survive, but it is found that the mortality is high. If, however, the plant is allowed to remain for a further three months, a stronger plant is obtained, and mortality is greatly reduced. The "tut" is severed from the parent plant just below the portion operated upon, and is planted without removing the husk. Where coconut shell is used, this has to be removed, and the young roots are frequently much disturbed and broken in the process. It would appear that the use of fibre produces the best results. Even in dry weather the transplanted "tuts" generally do well. As has been stated above, the chiku is generally the tree on which this method is used, and in this case at least, the advantages of this method are very evident. New plants, produced in this way, frequently bear fruit in their first year, but no fruit should be allowed to "set"

for the first two years. In the third year, a portion of the fruit may be allowed to mature, but after this period, the tree is sufficiently established to admit of all the fruit reaching maturity.

The advantages of this method may be briefly stated :

1. The quality of the fruit on the parent plant is ensured in the progeny ;
2. A stock is quickly raised, and "die outs" are discovered shortly after planting—ensuring uniformity of stock ;
3. The plants soon reach the bearing stage.

Native opinion differs as to the success of the method in producing limes, mangosteens, duku and other plants, but it is probable that the method might be applied to these plants with success. Its use with chikus probably accounts for the fact that the chiku is one of the best fruits in the Peninsula ; for it is acknowledged that many fruits deteriorate when propagated from seed : for instance, compare the Malayan margo raised from seed, with the Indian mango, raised by grafts.

It is probable that the method of "tut" is not Malayan in origin, but has been introduced into this country from the Dutch Islands. A great number of chiku "tuts" are annually brought into Singapore from Batavia and sell for about \$35 per 100. These imported plants are generally "tuts" of about three months, and the mortality is therefore high, (said to be 50 per cent.). The locally produced "tut" has a mortality of about 10 per cent. and sells for \$50 per 100.

NOTE.

Small quantities of seed of the following plants may be obtained upon application to the Director of Agriculture :

CEYLON SPINACH. (*Basella alba*).

A slender climbing perennial with succulent stems and leaves, which may be used as a pot herb or spinach. The plant may be propagated from seed which should be sown in rows in well-prepared soil. This spinach is a welcome addition to the vegetable garden.

ROSELLE. (*Hibiscus subdariffa*).

A shrubby annual. The fleshy calyx freed from the seeds makes excellent tarts and jellies. An article on the cultivation and uses of this plant appeared in the *Agricultural Bulletin, F.M.S.*, Vol. II, No. 3, p. 59.

SUMMARY OF LOCUST WORK FOR THE 1st QUARTER, 1917.

By F. W. SOUTH.

DURING this quarter a considerable improvement has been effected in the prospects of the locust destruction work. The breeding season which commenced in the Negri Sembilan, Malacca and Johore in November was terminated about the end of January in all the states. Subsequently two small swarms belonging to intermediate generations hatched out in Malacca in January and February and were easily disposed off, but the first generation of hoppers properly belonging to this year did not appear in Malacca and Johore until the middle of March. There was a tendency on the whole for all flying swarms to move towards the coast and as a result of this the few swarms remaining in the Negri Sembilan moved into Malacca during March, so that at the end of that month the Negri Sembilan like Selangor was quite free from locusts. Another effect of the westerly movement was that swarms arriving near the coast appeared to be blown out to sea by the strong land breezes; two disappeared from the coast of Johore during this period and one went out to Pulau Besar from Malacca during February but succeeded in returning.

The very wet weather during the quarter, though it hindered the driving work in Malacca, had a useful effect, as in Malacca and Johore numbers of the flying insects died, one swarm in Johore being nearly entirely destroyed while in Johore eggs in the soil were drowned in no less than four places. The swarms of hoppers that actually hatched out during March in Malacca and Johore were in consequence not very numerous, while the flying swarms remaining were quite few in number.

SELANGOR.

There were no locusts known anywhere in this State during the quarter and after the end of January the remaining mandor was paid off and the remaining conductor was transferred to Malacca. Since the Negri Sembilan was free from locusts at the end of the quarter and as such few swarms as may re-enter it from Malacca or Johore will almost certainly be confined to the southern end, it seems unlikely that Selangor will be reinfected.

THE NEGRI SEMBILAN.

The work of destroying the hoppers of the last 1916 season was, as stated in my last report, unfinished at the close of last year around Ayer Kuning, Batang Malaka and Gemenchah and Selaru. The swarms at Ayer Kuning and Selaru were all destroyed by the 5th and 6th January, respectively, while around Batang Malaka and Gemenchah work continued until 2nd February, when all the locusts were successfully destroyed. There were hoppers at Nuri and Johol and at Lunding where work was commenced on 1st January,

at the former two places and at the latter on 18th January; it was successfully concluded on the 19th of the month. On the 6th hoppers discovered at Pondoi commenced to be poisoned and were all destroyed by the 31st. After that the gang moved to Bukit Putus where a very large area of hoppers had recently been discovered; work continued here until 4th February, when the remaining insects had all developed into fliers and further work was useless. In all 347 swarms were destroyed during the quarter.

In January there were two swarms of fliers known which had not laid eggs, one small swarm at Selaru moving towards Inas and one at Bukit Putus near Gemencheh. A third swarm that should have been at Ayer Kuning disappeared possibly towards Nyalas. By the middle of February six swarms were known:

(1) A small of fliers near Ayer Kuning, with in addition a swarm of fair size in Malacca near Nyalas;

(2) A big swarm of young fliers at Bukit Putus;

(3) A big swarm of young fliers near Pondoi that had come in from Kemuning in Malacca;

(4) A small swarm between Tebong and Keru which had flown further into Malacca territory;

(5) A small swarm near Inas;

(6) A small swarm at Kendong that came from Malacca and eventually returned there. At the end of the month only two swarms were left in the Negri Sembilan: one at Bukit Putus and one at Pondoi. The Ayer Kuning swarm disappeared and that at Nyalas did not come to Ayer Kuning. The swarm from Inas flew through the Miku pass to Kendong and eventually to Kuala Linggi in Malacca where its off-spring were destroyed by Mr. Lyford at the end of the month. The swarm between Tebong and Keru and that at Kendong entered Malacca as shown.

During March the Bukit Putus and Pondoi swarms united at Tebong and were next seen probably at Gading in Malacca. This swarm was probably that which laid eggs at Jasin Lalang Estate in March; the resultant hoppers were to be destroyed there when they hatched out in April. The Ayer Kuning swarm became more and more scattered and finally disappeared. A large swarm from Nyalas just in Malacca flew to Ulu Gemas and thence to Batu Anam. Thus at the end of the month no more locusts were present in the State. The Ulu Gemas country was searched by a conductor between 16th and 24th February, and was reported free from locusts. It does not seem very probable that any unknown swarms now exist in the Negri Sembilan since work was in progress in the lalang country at various places early in the quarter and probably any swarms present would have been seen, afterwards the swarms known seem to have been carefully followed up. If locusts re-appear in the Tampin district they will probably have to come from Malacca or Johore; in Malacca the flying swarms remaining were only two or three in number at the end of the quarter so that no serious reinfection is likely to take place from there; the number of swarms reported from Johore was not large. As a result of this two scouting mandors were discharged and arrangements were made to reduce the staff further if locusts do not reappear in large numbers.

MALACCA.

The work during the hopper season which commenced in November was continued into this quarter. It was concluded in the Southern district on 12th January. The eggs which were reported to have been laid during December in the neighbourhood of Tebong in the Northern district hatched out in January and destruction work was carried on there and at Keru, Machap and Tebolang Estate until 8th February. There were nine flying swarms known at the end of January of which three, i, e, l, each at Rim, Selandar and Kelemak, were coupling.

In February hoppers were reported to have just hatched at Kuala Linggi on the 17th. These were believed to be the off-spring of the swarm known to be coupling at Kelemak in January. They were all destroyed between the 20th and 24th. There were three flying swarms along the coast at Merlimau, Serkam and Alai and others at Batu Berandam, Belimbing, Tebong and Ayer Pa Abas.

In March the swarms from Batu Berandam and Belimbing joined up and laid eggs at the 11th mile on the Durian Tunggal-Alor Gajah road, where hoppers appeared on the 17th and work was commenced on the 19th; it was not concluded at the end of the month, but was expected to continue for about ten days. On 23rd March, eggs were found in breeding grounds on Jasin Lalang Estate. The swarm that laid these eggs was believed to be that from Alai, since the latter was seen at Bukit Kajang on the 11th; it was believed to have joined the Bukit Putus swarm which was reported at Gading on the 13th. Arrangements were made for commencing work when the hoppers hatch out which will be during the first four days of April. The flying swarm at Merlimau was reported to have flown to Johore. Thus only the swarms seen in February at Serkam, Tebong and Ayer Pa Abas are left to lay eggs. It should not be long before Malacca is free of all locusts except such swarms as may come in from Johore.

In all 384 swarms of hoppers were destroyed. A total of 203 gangs containing 2,537 coolies were employed; the largest number of gangs employed on one day was nine and the average number was between three and four. There was some difficulty in getting coolies, but this was overcome by working overtime.

JOHORE.

When the quarter opened hoppers were known in the Tangkak district only. These had hatched out during December of the previous year at Bekok and around Tangkak. Two swarms of hopper belonging to an intermediate generation appeared in the Sungei Mati district in January. Unfortunately there was a delay in obtaining money and only sufficient was available to pay for the destruction of the hoppers around Tangkak; those at Bekok and in the Sungei Mati district escaped, eggs were also laid in January near Bukit Kepong in the Panchor neighbourhood but the laying ground was flooded and the eggs were drowned. Eggs were again laid in the Batu Anam, Tangkak and Sungei Mati districts at the end of February and the beginning of March, but only in the Tangkak district was destruction work necessary as the other eggs were drowned in the breeding grounds. At the close of the quarter

there were some eight or nine flying swarms known. Of these there were two swarms in the Tangkak district, possibly two near Batu Anam and four around Bandar Maharani with one somewhere between Panchor and Tangkak. The illness of one of the mandors in the Batu Anam district has made it impossible to ascertain with certainty what has become of the two swarms reported at different times in that neighbourhood. The country behind Mount Ophir around Bekok and along the Sungei Gemas was examined by a mandor and a cooly between February 1 and 10. Two flying swarms were found and the eggs subsequently laid by these were drowned in March near Bekok. There should not therefore be any invasion by an unexpectedly large number of flying swarms from this country this year and there is unlikely to be any serious invasion of locusts from Malacca as only two or three flying swarms are known there. The country around Batu Anam is the only part where there is much uncertainty regarding the number of locusts and this will be well examined when the finish of the destruction work leaves the remaining mandor available for this purpose.

Tangkak.—During January destruction work continued and a spraying gang was at work at various places near Tanah Merah, Paya Mas, Bukit Kempas, Ayer Batu, Paya Meranti, Paya Beranak and Sempang Sagil. A driving gang also worked at Paya Mas and Sulok, as was proposed in December, on account of the danger of poisoning the numerous cattle in these localities. Towards the end of the month the few remaining hoppers escaped as fliers, but the number was very small.

At Bekok the hoppers which appeared in December escaped owing to pressure of work elsewhere and a temporary lack of money for paying another gang of coolies. The escapes were not numerous. These escapes were the only flying swarms known at the end of January.

During February the country behind Mount Ophir, along the Sungei Chohong and the Sungei Gemas was carefully searched. Two small swarms of quite young fliers were found, one near Bekok town and one at Lubok Kedondong. Besides these there were two or three small swarms around Sagil, Belemang and Ayer Panas. The number of swarms was thus far less than it has been for a long time.

In March, the Bekok and Lubok Kedondong swarms joined up and laid eggs near Bekok at the end of the month. Owing to the constant heavy rains the eggs did not hatch. The flying insects were dying off as the month closed. The small swarms near Sagil joined up into one and remained in that locality. A further swarm came in from Chin Chin in Malacca and settled at Sebrang Gajah. No eggs had been found at the end of the quarter.

Sungei Mati.—In January hoppers appeared at Pengkalen Kundang as was expected in December. These could not be destroyed and escaped as fliers on the 27th moving to the Kesang river on the borders of Malacca. The swarm at Tanjong Selabok divided into two one part going to Tanjong Gading and the other to Telok Rimba. A new swarm came to Belamang from the Ulu and

there was a large swarm just inside Johore on the coast at Kuala Kesang which came from Malacca on the 27th. All these flying insects were young.

In February the swarms from Pengkalen Kundang entered Malacca. The swarm at Tanjong Gading disappeared entirely and was probably blown out to sea and lost. The Telok Rimba swarm was on the Malacca border but had not laid eggs. The swarm from Belamang moved to Merbau Berdarah and that at Kuala Kesang disappeared and was probably also blown out to sea. A new swarm arrived at Pulau Penari on the 22nd and at once divided; one part went to Glogoh and the other to Tanjong Bangsal where it was expected to join the Merbau Berdarah swarm. The females of this swarm were heavy with eggs.

In March, nearly all the insects in the Tanjong Bangsal and Merbau Berdarah swarms died owing to the constant heavy rains, a small separate portion went to the 3rd mile and then to Bukit Pasir in the Muar district. The swarm at Glogoh laid eggs on the 10th and eggs of the Telok Rimba swarm were also found but in both cases the eggs were destroyed by floods or heavy rains. At the close of the quarter no locusts could be found in the district.

Batu Anam.—There was no destruction work during January in this district. The country was thoroughly inspected. The only flying swarms found were at Bekok and Paloh; these were expected to lay in about two weeks. There were no locusts found anywhere else as far south at Kluang. The fliers reported at Tebing Tinggi in December had flown away and were probably those that arrived at Belamang in the Sungei Mati district.

In February the swarm of fliers at Paloh joined those at Bekok and eggs were laid at Bekok. At the end of the month hoppers appeared at 13 places near Bekok. The work of destroying these was somewhat delayed owing to a difficulty in obtaining sugar, but by the end of the 31st of March all the hoppers had been successfully killed.

In February also a swarm of fliers visited Tebing Tinggi for a few days and then moved towards Bukit Kepong. On the 7th another swarm arrived at Ulu Palong and Tambak from the Negri Sembilan direction and was probably the swarm from near Nyalas. It was uncertain if they remained or went back. In March, the fate of this swarm was not determined owing to the illness of one of the mandors while the other was engaged on destruction work. For a similar reason the report of the arrival of a new swarm at Paloh had not been verified. There were thus probably two flying swarms in this district when the quarter closed.

Muar.—In January the large swarm of fliers found in December five miles in from the end of the Jalan Bakri moved to Tanjong Selabok in the Sungei Mati district. Besides this only three or four small swarms a few yards in extent could be found in the district after a careful search. In February the district remained free from locusts, but in March a swarm came to Jorak and stayed on some newly chanked ground there for two or three days. This spot was in consequence searched for eggs by the mandor

and the Assistant Agricultural Inspector, but, none were found. A small swarm of fliers arrived at each of three other places, Bukit Dinding, Jalan Rami and Batu 18 during the month. These were thought to come from the Sungei Mati district. There should be no difficulty in destroying completely any hoppers that may hatch out in this district in the next quarter.

Panchor district.—In January, the swarm of fliers found in December, near Bukit Kepong laid eggs there on the 12th on an old “padang” but this was flooded and the eggs were drowned. A flying swarm was reported up-river as visiting Bukit Serumpang near Bukit Kepong at times for a day or two, but this was not seen by the mandor. This latter swarm was not heard of again in February but it was probably somewhere between Tebing Tinggi and Bukit Kepong as it was reported by the Batu Anam mandor to have visited Tebing Tinggi. One other swarm visited Kundang, beyond Nordanal estate near the river, but it only stayed a day or two and then went back towards Tangkak. On 16th March, a large swarm appeared behind Panchor village and stayed for a few days. It then flew away to Grisek and back towards Tangkak. There were thus no locusts in this district at the end of the quarter.

CONCLUSION.

The situation in general would seem to be quite satisfactory and to show a very marked improvement on that at this time last year. There are now no locusts in Selangor or the Negri Sembilan only two or three swarms remain in Malacca and eight or nine swarms in Johore, so far as is known. There should be no difficulty in destroying completely all the hoppers that may spring from these swarms. In the Negri Sembilan and Malacca and on the boundaries of these with Johore all country suitable for the development of unknown swarms has been or is being well searched. If there is any unexpected increase in the number of the locust swarms when the weather becomes drier, it is difficult to say from what source such an increase can come. The position is such that it is tempting to risk the forecast that by the end even of the next season, more certainly of the year, if any locusts remain in the country, they should be limited to two or at the most three swarms. Previous experience, however, suggests the wisdom of refraining from any forecast.

TABLE OF RESULTS, 1ST QUARTER, 1917.

State.	District.	Locality.	Date.	Swarms Driven.	Tins.	Swarms poisoned.	Total Swarms.	State Totals.
Negri Sembilan ...	{ Tampin and Kuala Pilah	{ Ayer Kuning Batang Malaka and Gemencheh Gemencheh ... Pondoi ... Bukit Putus ... Selaru ... Lunding and Johol	1st to 5th January ...	...	...	33	33	347
			1st to 31st "	...	...	172	172	
			1st and 2nd February ...	...	...	9	9	
			6th to 31st January ...	...	...	73	73	
			1st to 4th February ...	...	...	13	13	
Malacca ...	{ Southern	{ Diamond Jubilee... Batang Malaka ... Chabau ... Rim ... Keru ... Tebong ... Machap ... Tebolang Estate...	1st to 6th January ...	...	...	8	8	347
			1st to 19th " ...	2	...	37	39	
			Total ...	2	...	345	347	
			1st to 12th January ...	269	...	...	269	
			1st to 31st January ...	...	...	...	...	
Malacca ...	{ Northern	{ Parit Malana, lith Mile Durian Tunggul-Alor Gajah and Durian Tunggul-Machap Roads	1st to 8th February ...	29	...	...	29	384
			Total ...	298	...	...	298	
			20th to 24th February ...	17	...	...	17	
			19th to 31st March ...	69	...	...	69	
			Total ...	384	...	...	384	

TABLE OF RESULTS, 1ST QUARTER, 1917.

State.	District.	Locality.	Date.	Swarms Driven.	Tins.	Swarms Poisoned.	Total Swarms.	State Totals.	Remarks.
Johore	Tangkak Panohor	Near Bukit Kepong	1st to 31st January 25th January	136	184	72	208		Eggs were drowned by floods.
	Batu Anam Tangkak	Bekok	March to 31st			32	32		Eggs drowned by rain.
	Sungei Mati	Tanjong Bungsal Merbau Berdarah	March						The flying insects died in large numbers owing to wet weather.
Johore		Glogoh and Telok Remba	March						Eggs were laid in both about 10th March, but were drowned by the heavy rains.
			Total	136	184	104	240	240	
			Grand Total					971	

INDIAN IMMIGRATION COMMITTEE.

A MEETING of the Indian Immigration Committee was held at Kuala Lumpur, on 9th May, 1917.

There were present: The Controller of Labour (Mr. J. R. O. Aldworth), Chairman, the Principal Medical Officer, F.M.S. (Dr. C. L. Sansom, C.M.G.), the Hon'ble Mr. J. Mitchell, the Hon'ble Mr. E. E. Smith, Mr. W. Duncan and Mr. F. G. Harvey, with the Secretary, Mr. E. W. F. Gilman, Deputy Controller of Labour, Penang.

The following statements of arrivals and departures of Southern Indians for the period 1st January to 30th April, 1917, and for the corresponding periods in the five preceding years, were laid before the Committee:

ARRIVALS.

Year.	State-aided.			Ordinary.		
	Adults.	Minors.		Adults.	Minors.	
1912	15,120	1,103	...	6,619	398	...
1913	15,707	1,233	...	6,391	455	...
1914	11,875	988	...	5,682	340	...
1915	4,364	291	...	2,178	141	...
1916	12,162	1,076	...	5,389	522	...
1917	15,171	1,455	...	6,121	432	...

DEPARTURES.

Year.	Adults.			Minors.		
1912	...	...	22,139	...	787	...
1913	...	...	27,827	...	1,347	...
1914	...	...	27,659	...	1,336	...
1915	...	...	21,429	...	996	...
1916	...	...	20,996	...	804	...
1917	...	...	22,751	...	889	...

A return was presented showing that the number of kangani licences registered in Penang from 1st January to 30th April was 5,183 compared with 3,871 registered in the corresponding period of 1916.

During the first four months of the year, 52 licences were refused registration at Penang and 92 were cancelled in consequence of reports received from the Emigration Agents in India.

The attention of employers was drawn to the fact that in connection with the restrictions imposed on the emigration of labourers to Malaya, all persons under the age of 18 years are regarded by the Government of India as minors. Minors are prohibited from emigrating unless proceeding accompanied by their parents or guardians or with their consent.

For the last twelve months licences to kanganies to recruit have in the first instance been limited to a period of six months. It was decided that the six months standard be strictly adhered to, but that the Emigration Agents in India be empowered to grant extensions in very exceptional cases up to three months.

The Chairman reported that owing to the prevalence of plague it had been necessary for six months, from October to March, to suspend the issue of licences to recruit in the Coimbatore and Salem districts. From the 6th April all restrictions had been removed.

A statement of quarantine expenses was submitted and considered showing that the average cost per head at each station for the 1st quarter 1917, was as follows: Penang, \$2.03; Port Swettenham, \$1.38; general average, \$1.69.

Audited accounts for the half year ending 31st March, were laid on the table and passed after consideration. Arrears of assessment were considered but it was decided not to write off any item.

It was decided, subject to the consent of His Excellency the High Commissioner, to prescribe for the 3rd and 4th quarters of 1917 a quarterly rate of \$2 to be paid by every employer in respect of every Indian labourer employed or working on the place of employment during the respective quarters. Similar rates were prescribed for the Straits Settlements and for Johore, Kelantan, Kedah and Perlis. The number of working days prescribed in a quarter for the purpose of calculating this assessment was again fixed as 78 for the next two quarters.

It was decided to pay a recruiting allowance of \$5 on account of all labourers recruited by licensed kanganies introduced during the 3rd and 4th quarters of 1917.

A proposal of Government that a small sub-committee of the Indian Immigration Committee be appointed to go into the terms and conditions of the next contract for rations for the Port Swettenham Quarantine Camp was considered and the Hon'ble Mr. E. E. Smith and Mr. F. G. Harvey were appointed with the Principal Medical Officer to form the sub-committee.

The Chairman presented the report of the Superintendent of the Home for Decrepit Indians for the six months ending 31st March, 1917. One hundred had been admitted during this period, 53 repatriated to India and the number remaining on the 31st March, 1917, was 49.

The Hon'ble Mr. Mitchell referred to the question of the extension of the Tamil Immigration Fund Ordinance to Singapore. He considered that the matter should not be allowed to drop. Messrs. Mitchell and Duncan undertook to ask His Excellency the Governor, who was to visit Penang shortly, to be good enough to grant them an interview on the subject.

**MINUTES OF A MEETING OF THE ADVISORY
COMMITTEE, DEPARTMENT OF AGRICULTURE,**

HELD AT THE OFFICES OF THE DEPARTMENT, KUALA LUMPUR,
ON 26TH JULY, 1917, AT 11 A.M.

Present:—Mr. L. Lewton-Brain, Director of Agriculture (Chairman), Messrs. H. Armstrong, C. Bell, W. de L. Brooke, R. W. Munro, J. D. McCulloch and L. Mooijaart.

Absent:—The Hon'ble Mr. R. C. M. Kindersley, Messrs. W. S. Cookson, W. Dell, J. S. Ferguson, T. W. Hodge, A. B. Milne and H. R. Quartley.

Messrs. F. W. South and W. N. C. Belgrave attend the meeting.

Mr. B. Bunting, Assistant Agriculturist, officiates as Hon. Secretary to the meeting.

1.—MINUTES.

The minutes of the previous meeting held on 30th May, 1917, having been circulated were taken as read and confirmed.

Mr. MUNRO said that he wished to make a few remarks with regard to the advisability of drawing the attention of the general public to the existence of the Advisory Committee by reporting the progress of the meetings to the local press and thus showing the planting community what was being done by the Advisory Committee.

The CHAIRMAN replied that he thought that there would be no objection to publishing an abstract of the minutes in the *Agricultural Bulletin* and promised to refer the matter to Government.

2.—EXPERIMENTAL COCONUT PLANTATION.

The CHAIRMAN informs the Committee that Government had agreed to purchase, for \$175,000, Sipantas Estate which adjoined the Reserve for the experimental Coconut Plantation. The area of the estates was 2,000 acres, of which 250 acres was planted with coconuts, 100 acres coconuts interplanted with rubber and 100 acres newly planted rubber. Permanent lines and buildings had been erected and the estate had a labour force of 400 coolies which would be retained. He hoped to report at the next meeting that progress had been made in cleaning up the estate.

Mr. ARMSTRONG asked whether it would be possible to go ahead with experimental work.

The CHAIRMAN replied that as soon as the place had been cleaned up this would be possible and that he proposed to form a sub-committee who would make suggestions for carrying out experimental work to the Advisory Committee at the next meeting.

3.—EXPERIMENTAL FARMS.

The CHAIRMAN said that with regard to the establishment of Experimental Farms it had been suggested that a Special Commission be appointed to consider the matter.

4.—AGRICULTURAL CONFERENCE.

The CHAIRMAN reports that the Planters' Association of Malaya had approved the suggestion for the formation of a General Conference Committee and proposed that the election of the Executive Committee be made by the General Committee. He asked the members present to see that the District Associations elect their member for the General Committee without loss of time.

The CHAIRMAN said that he did not think it would be possible to hold the next Agricultural Conference before September 1918.

5.—APPOINTMENT OF SUB-COMMITTEES.

The following sub-committees were appointed :

(1). *Pests and Diseases*.—Messrs. H. Armstrong, J. S. Ferguson, J. D. McCulloch, A. B. Milne and L. Mooijaart.

(2). *General Experiments*.—The Hon'ble Mr. R. C. M. Kindersley, Messrs. C. Bell, W. de L. Brooke and T. W. Hodge.

(3). *Coconut Experimental Plantation*.—Messrs. W. S. Cookson and R. W. Munro.

(4). *Pondok Tonjong Estate*.—Messrs. W. S. Cookson and A. B. Milne.

(5). *Castleton Estate*.—Messrs. W. Dell and R. W. Munro.

(6). *Kuala Tembeling Estate*.—Messrs. T. W. Hodge and J. D. McCulloch.

6.—PESTS AND DISEASES.

The CHAIRMAN informs the Committee that a circular letter with regard to the removal of dead timber had been drawn up and would shortly be circulated. Memoranda on "Clean Clearing" and "Bark Diseases" were being printed as leaflets for general distribution.

The CHAIRMAN reports that the scheme for training additional sub-Inspectors had been forwarded to the Under Secretary but so far he had not received any reply. He also reports that the vote for employing labour to work on cleaning up kampongs had been increased to \$10,000 for 1918.

A letter is read from Mr. A. B. Milne saying that "claret-coloured" bark canker is very serious in some districts and in his opinion it is not receiving the attention that it should.

In commenting on the letter the Chairman remarked that there was only one mycologist left in the department who was already occupied in investigating three new and important bark diseases, work on two of which is nearing completion, and he did not think more could be expected from one officer.

The Committee disagreed with the views expressed by Mr. Milne and considered the Department was doing everything possible to combat these bark diseases.

Mr. Belgrave said that nothing could be laid down as to treatment of water-logged bark until the disease had been further investigated, but promised to include a short description of the disease in the memorandum on "Bark Cankers".

The Chairman reads a letter, also from Mr. Milne, asking whether it would not be possible to arrange for the training of young Eurasians and Chinese in Elementary Physiology, Forestry and Plant Sanitation with a view to supervising "Pest-gangs" on estates. The Chairman said that this matter had already been dealt with by the sub-committee for "pests and diseases" and in his opinion the training of such men should be done by an Agricultural School.

Mr. Munro proposed and Mr. McCulloch seconded that the Committee consider the suggestion an excellent one but there were no facilities at present for carrying out this work.

Mr. Armstrong referred to the reports of a new leaf disease of *Hevea brasiliensis* which appeared to be doing considerable damage in Dutch Guiana and asked whether there was any danger of the disease being introduced to this country.

Mr. South suggested that it might be necessary to safeguard this country by prohibiting the importation of seed, leaves and stems of *Hevea* from British Guiana or other countries where this disease was known to exist. It was agreed to recommend that this prohibition be gazetted under Section 21 (i) of the Agricultural Pests Enactment.

The meeting terminates at 12.45 p.m.

MINUTES OF MEETING OF THE PLANTERS' ASSOCIATION OF MALAYA,

held at the Johore Club, Johore Bahru, on 20th
October, 1917, at 10.30 a.m.

PRESENT :

The Honourable Mr. R. C. M. Kindersley (*in the Chair*)
„ H. C. E. Zacharias (*Secretary*)

and the following DELEGATES :

From Batang Padang D.P.A.	...	Messrs. H. Kingsley Ward and O. H. Barber
„ Johore P.A.	...	Messrs. A. L. Buyers, J. H. Monson and C. Bradbery
„ Kajang D.P.A.	...	Mr. P. R. Pinhorn
„ Kapar „	...	„ L. Mooijaart
„ Kuala Lumpur D.P.A.	...	„ D. R. Barwise
„ Kuala Selangor D.P.A.	...	„ Thos. H. Menzies
„ Malay Pen. Agl. Assn.	...	Messrs. J. W. Kennedy and M. Strivens
„ Negri Sembilan P.A.	...	„ J. Davidson McCulloch, C. Ritchie, W. Buyers, V. A. Tayler and G. B. W. Gray

VISITORS—Messrs. H. H. Stirrup (Assistant Agricultural Inspector, Johore), H. Anderson, Heber G. Stout, R. C. Lindsey, H. Henley, W. B. Campbell, F. P. Marshall, J. S. Beldham, A. B. Fowler, E. G. Spencer, B. W. Robertson and Major J. Daud.

1. The minutes of the meeting held on 29th August are taken as read and confirmed.

Mr. BUYERS on behalf of the Johore Planters' Association welcomes the Planters' Association of Malaya to Johore.

The SECRETARY reads the following letter :

“KLANG,
“ 18th October, 1917.

“DEAR SIR,

“At a meeting of the Klang District Planters' Association held yesterday, I was instructed to write to protest on behalf of this Association against the failure of the Planters' Association of Malaya to postpone the meeting called for the 20th instant after having been notified, so long ago as 3rd October, that the date arranged would make it impossible for many delegates to be present from the Coast Districts of Selangor on account of the compulsory camp in Klang for members of 'B' Company of the Malay States Volunteer Rifles.

"The meeting was of opinion that the representation of Constituent Associations should have had more weight in arranging the date of the Planters' Association of Malaya meeting than 'Our Day' celebration in Johore. Even if the meeting had been arranged for the day following the celebration of 'Our Day,' all the Coast District delegates could not possibly have been present.

"There are several matters of great importance on the agenda of the Planters' Association of Malaya and Klang District Planters' Association was particularly desirous that its delegates might have been present.

"Yours faithfully,

"(Sd.) C. A. BUXTON,

"*Hon. Secretary, Klang D.P.A.*

"THE SECRETARY,

"PLANTERS' ASSOCIATION OF MALAYA,

"KUALA LUMPUR."

Mr. KINDERSLEY agrees that it was regrettable that the date selected had made it impossible for more members from Selangor to attend, but the date of course had been selected primarily to suit the convenience of their hosts and it was obvious that no date would be found equally convenient to all delegates.

2.—WAR RELIEF.

The SECRETARY submits the following statement of monies received to date during the present financial year:

Batang Padang	...	...	...	\$ 480.00
Batu Tiga	...	...	...	1,641.00
Central Pahang	...	...	...	485.00
Central Perak	...	...	...	959.00
Kajang	...	...	...	761.00
Kapar	...	...	...	355.47
Klang	...	...	...	1,950.00
Krian	...	...	...	1,191.46
Kuala Langat	...	...	...	670.00
Kuala Lumpur	...	...	...	1,523.18
Kuala Selangor	...	...	...	255.50
Lower Perak	...	...	...	1,705.10
Negri Sembilan	...	...	...	2,350.00
Taiping	...	...	...	2,177.76
Ulu Selangor	...	...	...	1,219.62
Total F.M.S.				17,724.09
Colony	...	...	...	136.07
Johore	...	...	...	2,779.00
Kedah	...	...	...	343.00
Total				\$20,982.16

The SECRETARY also reads the following letters :

" KLANG,

" 27th September, 1917.

" DEAR SIR,

" At our meeting of 25th instant, the subject of the Planters' War Relief Fund was discussed and the majority of members are strongly in favour of continuing monthly subscriptions, but several members complained of insufficient information as to how the Fund's money was being expended. I was instructed to ask you if you could furnish me with a list of the grants already made and supply me periodically with additions to this list. I can assure you that all such information will be kept private and only passed on to members of this Association.

" I am of opinion that if some information can be supplied I shall be able to get some members who have stopped their subscriptions to reconsider the matter.

" Yours faithfully,

" (Sd.) C. A. BUXTON,

" Hon. Secretary, Klang D.P.A.

" THE SECRETARY,

" PLANTERS' ASSOCIATION OF MALAYA,

" KUALA LUMPUR."

" PETALING,

" 16th October, 1917.

" DEAR SIR,

" At a meeting of this Association held on the 13th instant, the following resolution was passed :

" That the Chairman of the Planters' Association of Malaya be requested to be good enough to draft a special letter of appeal for more support to the Planters' War Relief Fund, such appeal to be sent to every planter in the country through the various District Planters' Associations supported by the various Committees, some time about Christmas.

" I shall be much obliged if you will bring forward this resolution at the next meeting.

" Yours faithfully,

" (Sd.) F. G. HARVEY,

" Secretary, Kuala Lumpur D.P.A.

" THE SECRETARY,

" PLANTERS' ASSOCIATION OF MALAYA,

" KUALA LUMPUR."

As regards the letter from the Klang District Planters' Association, statements of accounts were now being regularly received and he refers the meeting to those published on pp. 4/7 of the

minutes of the previous meeting. He presumes that this is the information required. As regards the general working of the fund, the matter had been put concisely in a letter from the Hon'ble Mr. W. F. Nutt to the Chairman which read as follows:

"KUALA LUMPUR,

"17th October, 1917.

"PLANTERS' WAR RELIEF FUND.

"DEAR SIR,

"I have noticed at recent meetings of the various Planters' Associations that the question of the Planters' War Relief Fund is discussed, and from the printed reports of these discussions it has occurred to me that planters were searching for information which out here it is difficult for them to obtain. So I thought if I addressed you a letter in this connection it might ease the position and let planters know how this fund is being administered at Home. The Planters' War Relief Fund and the No. 2 Scheme of the Federated Malay States War Relief Fund join hands in London and are under the control of an Executive Committee consisting of Messrs. Payne, Young, the Chairman of the Rubber Growers' Association, and until recently Mr. Macfadyen, with Sir William Taylor as Chairman and Treasurer, Mr. Hale, Hon. Secretary, and Mr. Cullen, Auditor. I was made a member of this Committee while at Home and was kept in touch with all that was going on. Besides this Committee there is a large General Committee consisting of planters and others who have been resident in the Federated Malay States which meets periodically.

"Regular monthly meetings of the Executive Committee are held, and emergency meetings when cases requiring urgent attention occur. At the monthly meetings, cases for relief are carefully gone into in the most sympathetic manner. Sir William Taylor devotes a good deal of his time investigating cases and getting into touch with relatives of officers and men of the Federated Malay States who have fallen in this war or who are wounded and require assistance.

"Mr. Hale carefully watches the casualty list with the latest Roll of Honour published from time to time by the *Malay Mail* and cases are followed up. Should members of the General Committee hear of cases requiring relief they at once notify the Executive Committee. As regards the funds at the Committee's disposal they are carefully invested in War Stock and everything is done to watch the financial side of the fund. Grants are made to cover the period of a year, and all cases come up for further consideration at the end of that period.

"With regard to the local control, this is in the hands, as you are aware, of Sir Edward Brockman, Hon. Mr. Aldworth, myself and yourself. Cases are from time to time investigated and where found necessary relief is at once given.

"Both by the London Committee and the Local Committee only temporary assistance can at the moment be given, as it is impossible to know, with the prolongation of the war, what calls there may be on the fund, and as since the inception of the fund more and more men have left to join the forces, the calls on this fund

will probably be more than was at first expected, it is therefore essential if the fund is to be a success, and to do all that is desired, for subscriptions to be regularly maintained.

"Thanking you for the opportunity of addressing you.

"Believe me, etc.,

"(Sd.) W. F. NUTT,

"*Hon. Secretary, F.M.S. War Relief Fund.*

"THE CHAIRMAN,

"PLANTERS' ASSOCIATION OF MALAYA,

"KUALA LUMPUR."

Mr. KINDERSLEY thinks that the letter just read would dispel any ignorance on the subject which might still exist. At their last meeting, the matter of War Relief had been referred back to the District Planters' Associations, but he was not so certain that a great deal of a practical nature had since been effected. He feels that what really was wanted was a new start off.

It would be seen from Mr. Nutt's letter that the fund is not large enough to admit of the purchase of annuities or to give any form of permanent allowances, and it is only possible at present to give temporary relief.

They, who had remained behind in this country, were in a position to provide the necessary funds to ensure the future of many of those men who become permanently disabled or of their dependents, but if they waited until after the war, he felt sure that there will be so many demands that it will be impossible even by special efforts to raise the necessary amount.

He proposes that they should make another effort to get the fund into a satisfactory position by recommending to each of the District Associations that they pass a resolution that each planter in the district should give a day's pay a month towards the fund and that two members be appointed by each Association to canvas the individual members who are not already subscribing.

He further suggests that the names of the subscribers should be printed with the minutes of each meeting of the Planters' Association of Malaya.

He hopes that, if the planters will give this lead, other communities will follow suit.

Mr. RITCHIE, speaking of his own Association, says that some effort had been made since the last meeting, but it certainly did not come to very much. Whilst concurring with all that Mr. Kindersley had said, he thinks that if the names of all individual donors are published, at least the amounts given should not appear.

Mr. TAYLER seconds Mr. Kindersley's proposal with which he would incorporate the recommendation from the Kuala Lumpur District Planters' Association—i.e., to issue an appeal signed by the Chairman, and he hopes that this letter would include the particulars given by Mr. Nutt in his very interesting résumé.

The proposal in this form is then put to the meeting and carried unanimously.

Mr. KINDERSLEY, before leaving the subject, thinks that they ought to take the opportunity of passing a vote of thanks to Sir William Taylor for the work he was so efficiently and energetically doing for them in London.

Carried.

3.—INDIAN LABOUR.

The SECRETARY reports having received and circulated the following letter from the Controller of Labour:

“KUALA LUMPUR,

“10th September, 1917.

“No. 343/17.

“SIR,

“I have the honour to invite your attention to three points in connection with recruiting, and should be glad if you could give publicity to the matters referred to.

“2. The first is the misconception that exists as to the respective duties of the Madura Company or Messrs. Binny & Co., and of the Emigration Agent stationed at Madras or Negapatam, respectively. I cannot explain the situation more clearly than by quoting from the speech made by me at the Planters' Association of Malaya meeting held in April, 1916, at Kuala Lumpur. I then said, ‘I think it is desirable that Managers should realize that all the work in connection with emigration is performed by the Emigration Agents, officers paid by the Government, not by the Madura Company or Messrs. Binny & Co., who are your Financial Agents and, so far as the recruiting business or the return of voluntary immigrants is concerned, nothing more.’

“3. To illustrate the misconception that still exists after the public explanation I quote from a letter recently received by the Madura Company from a Manager in Perak. ‘At the same time I thank you for examining the coolies brought for shipment here and only allowing those who are sound to come through.’ This letter was passed on by the Manager of the Madura Company to the Emigration Agent for his information.

“4. On all matters connected with the working of the dépôts in India, the Deputy Controller of Labour at Penang should be addressed. Unnecessary correspondence and trouble are caused when complaints or enquiries are addressed to mercantile firms who have no responsibility for the arrangements in the dépôt.

“5. The second point to which I would refer is the confusion often caused by reference being made to the Financial Agents in cases in which licences are for some reasons detained at Penang. Such licences usually follow the kangani by the next steamer and can be obtained on application to the Emigration Agent. The kangani sometimes in error applies to the Financial Agents and weeks are wasted while the matter is the subject of correspondence between the Financial Agents and the Manager in the Federated Malay States.

"6. The final point upon which I wish to address you is the filling up of kangani licences. The arrangements as regards recruiting commissions should be stated so as not to be open to misinterpretation in India. There should be no reference to single unmarried women or girls and youths which could possibly be construed into the offer of special inducements for the recruiting of such labour. Too great care cannot be exercised in this respect as any misinterpretation of such terms might have a very serious effect upon recruiting for the whole country.

"I have, etc.,

"(Sd.) J. R. O. ALDWORTH,

"Controller of Labour, F.M.S.

"THE SECRETARY,

"PLANTERS' ASSOCIATION OF MALAYA,

"KUALA LUMPUR."

The SECRETARY reads the following letter :

"KUALA SELANGOR,

"24th September, 1917.

"DEAR SIR,

"RECRUITING.

"At a general meeting of the Kuala Selangor District Planters' Association held in August, reference was made to the alleged bribery of kranies and the ill-treatment of coolies at Negapatam. One member mentioned that it had been notified to him that even in villages Inspectors refused to pass coolies as being sound unless some present were made. As the matter is a serious one, I have been instructed to communicate with you in the hope that you will bring the subject forward for consideration and investigation.

"I am, etc.,

"(Sd.) R. S. McCULLOCH,

"Hon. Secretary, K.S.D.P.A.

"THE SECRETARY,

"PLANTERS' ASSOCIATION OF MALAYA,

"KUALA LUMPUR."

Mr. MENZIES remarks that these complaints were widely prevalent and considers that it was just about time they told the Madras Government about this and asked them to put a stop to what was a very serious and disgraceful state of affairs.

Mr. RITCHIE agrees that these complaints were heard on all sides and although it was of course difficult to obtain satisfactory evidence he submits that the value of evidence in regard to these complaints was cumulative.

Mr. KINDERSLEY suggests that the matter be referred in the first instance to the Controller of Labour and this is agreed to.

The SECRETARY reads the following letter from the Controller of Labour.

"KUALA LUMPUR,

"4th October, 1917.

"No. 430/16.

"SIR,

"I have the honour to invite your attention to the published report of the proceedings of the Planters' Association of Malaya at their meeting at Sungkai in June last, where on page 23, it is reported that the Secretary read a letter from the Under Secretary concluding with these words:

"The suggestion of the Government of Madras as regards midwives will also doubtless have to be carried out. If the midwives cannot be obtained locally it would be advisable that application for them should be made or the vacancies advertised in Madras.' The meeting then agreed that the matter should be referred to a Standing Committee.

"2. It has not come to my knowledge that any practical steps towards obtaining midwives have as yet been taken. I should be much obliged to be informed what progress has been made in the matter.

"3. I shall be most pleased, if so desired, to assist in procuring midwives from India or in arranging for their training locally.

"I have, etc.,

"(Sd.) J. W. CONDALL ELLIS,

"for Controller of Labour, F.M.S.

"THE SECRETARY,

"PLANTERS' ASSOCIATION OF MALAYA,

"KUALA LUMPUR."

Mr. TAYLER thinks that most estates were unaware that such midwives were required.

Mr. KINDERSLEY is doubtful as to what "trained" midwives meant, most estates of course were employing midwives.

Mr. MOOIJART reminds the meeting that previous attempts to train midwives locally had been quite unsuccessful, and he would like to know how and what number of midwives the Controller of Labour now thought could be obtained locally.

Mr. RITCHIE proposes that the Controller of Labour be first asked for a definition as to the term "trained" midwives.

Mr. TAYLER seconds but would add that the Standing Committee be instructed to consider the reply from the Controller of Labour, and if necessary to circularize all members of Constituent Associations accordingly.

The proposal is agreed to in this form.

4.—JAVANESE LABOUR.

The SECRETARY reads a letter addressed by him to the Rubber Growers' Association under date 6th September, 1917.

5.—TODDY.

The SECRETARY reads the following letters :

"KUALA LUMPUR,

"30th August, 1917.

No. 3832/17.

"SIR,

"With reference to my letter dated the 29th August, on the subject of a passage in Mr. Mooijaart's memorandum, published in the *Malay Mail* of the 28th instant, I have the honour to inform you that my attention has been directed to the précis of correspondence filed in this office which was prepared by Mr. McCabe Reay and which is published in the proceedings of the Toddy Commission (page 372).

"The paragraph under date 14th May, 1916, would appear to bear out the statement made by Mr. Mooijaart but the précis is incorrect and the facts are as stated in my letter of the 29th instant.

"2. I have referred to Mr. Reay and I enclose for your information a copy of a letter from him explaining how the mistake arose.

"I have, etc.,

"(Sd.) E. L. BROCKMAN,

"Chief Secretary, F.M.S.

"THE CHAIRMAN,

"PLANTERS' ASSOCIATION OF MALAYA,

"KUALA LUMPUR."

"OFFICE OF THE DEPUTY PUBLIC PROSECUTOR, F.M.S.

"KUALA LUMPUR,

"30th August, 1917.

"DEAR SIR EDWARD BROCKMAN,

"I have compared my précis of the minute dated 14th May, 1916 (printed at page 372) with the original, and find it is incorrect.

"2. The mistake arose from my using typed copies of the minutes when preparing the précis, the copying clerk having transformed your postscript 'I propose to appoint a Committee' into 'I propose to appoint a Commission' and then tacked this on to His Excellency's reply.

"3. I regret the trouble caused to yourself, Mr. Mooijaart, and possibly others, by this mistake, for which I am entirely responsible.

"4. The foot-note in parenthesis is based on the minute and consequently erroneous in the same way.

"Yours faithfully,

"(Sd.) J. McCABE REAY.

" KUALA LUMPUR,
" 7th September, 1917.

" SIR,

" I have the honour to inform you that the report of the Toddy Commission and Committee were considered at the last meeting of this Association held on the 29th ultimo, when I was instructed to forward to you the following resolutions which were carried unanimously :

" (1) to enquire whether and when an European Inspector is to be appointed to collect information with regard to the toddy traffic as suggested by the Toddy Committee ;

" (2) that the Government be asked to have the following monthly returns published in the local papers :

' State ;

' District ;

' No. toddy-shops ;

' No. of times each toddy-shop visited by European Health Officer ;

No. of samples of toddy analysed ;

' " " " found to exceed standard of acidity or alcohol ;

' " " " examined for adulterants (what adulterants are looked for) ;

' " " " found adulterated ;

' No. of prosecutions.'

" (3) that Government be asked to consider the advisability of inviting members of the medical profession to attend an Annual Medical Conference.

" I have, etc.,

" (Sd.) H. C. E. ZACHARIAS,

" *Secretary.*

" UNDER SECRETARY,

" FEDERATED MALAY STATES,

" KUALA LUMPUR."

" KUALA LUMPUR,

" 3rd October, 1917.

" No. 3987/17.

" SIR,

" I am directed to acknowledge the receipt of your letter dated 7th September, 1917, forwarding certain resolutions passed at the meeting of the Planters' Association of Malaya on the 29th August.

" 2. With regard to the first resolution, while the Government has accepted this suggestion of the Toddy Committee that a European Inspector should be appointed to collect information with regard to

the toddy traffic, it has not been found possible at present to carry out that suggestion. It is the view of the Government that, having regard to the need for men for the army in Europe, if any officers could be spared from their present duties, they should go to the war and that the Government would not be justified in detailing an officer specially for new duties such as the inspection of toddy at the present time.

"3. With regard to the second resolution, the Government does not consider that any good purpose would be served by the publication in the local papers of the returns suggested, and is not prepared to publish them.

"4. The question of inviting the medical profession to attend an annual conference is one which will have consideration. The Government Medical Staff and also the number of private practitioners has been so much reduced owing to the call for men for military duty that those who remain in this country must be fully occupied. For this reason the Government is somewhat reluctant to invite them at the present moment to give up the time which would be necessary for such a Conference. The suggestion is one which commends itself to the Government, and the Principal Medical Officer will be asked to go into the question with a view to arranging for a Conference when circumstances will permit if he should find that the suggestion meets with sufficient support among medical practitioners.

"I have, etc.,

"(Sd.) S. McARTHUR,

"Under Secretary to Government, F.M.S.

"THE SECRETARY,

"PLANTERS' ASSOCIATION OF MALAYA,

"KUALA LUMPUR."

The SECRETARY also reports the receipt of the following letters from the Malay Peninsula Agricultural Association and the Kajang District Planters' Association, respectively:

"PENANG,

"4th October, 1917.

"DEAR SIR,

"We are instructed to give you notice that at the next meeting of your Association a delegate from this Association will move the following resolutions:

"CONTROL OF TODDY.

"That this Association views with considerable apprehension the continuance of the system of calling for tenders for toddy-shops licences. Also it considers it extremely undesirable that the toddy traffic of the whole country should continue to be under the entire control of Tamils as at present. It strongly urges the necessity for more responsible control, and suggests that every estate should be encouraged to establish a toddy-shop of its own, if possible, so that there would be no inducement for coolies to leave their own estate and visit toddy-shops on the public road.

"To obtain efficient and reliable control the Association is strongly of opinion that these shops should be placed under the entire control of the Manager of each estate, on the following conditions :

"That Government take a fair percentage of the gross sales as rental.

"That the labour force on the estates participate in some form or other, in all profits from the sale of toddy.

"That separate accounts be kept, so that all transactions may be clearly shown and that these be open to inspection by Government officials at all times.

"That toddy-shops on public roads be taken over and run by Government in the same way as is suggested for estate toddy-shops.

"It is urged that if toddy-shop licences were granted on these conditions that private profiteering would be entirely eliminated, that the most efficient control would be effected, and that the agricultural labour force of the country would benefit to no inconsiderable extent by the change of system recommended.

"We are, etc.,

"(Sd.) KENNEDY & Co.,

"Secretaries.

"THE SECRETARY,

"PLANTERS' ASSOCIATION OF MALAYA,

"KUALA LUMPUR."

"KAJANG,

"25th September, 1917.

"DEAR SIRs,

"The following is an extract from the minutes of a meeting of the Kajang District Planters' Association, 18th September, 1917.

"3. *Toddy*.—Mr. Pinhorn stated that, owing to the distance of the nearest toddy-shop from Dunedin Estate, he had asked the Licensing Board to be allowed to purchase toddy in bulk and retail it at market prices to his coolies. The Licensing Board replied that they had decided to call for tenders for a shop on Dunedin Estate next year, but it would not follow that any of the tenders would be accepted.

"Mr. Pinhorn pointed out that his sole idea was that by retailing the toddy himself he would have a check on the consumption of toddy, especially with regard to sick coolies. He had also arranged to have the toddy periodically analysed. A public toddy-shop on the estate would not meet the case, in fact the Estate Manager would oppose such a shop.

"It was decided that the Standing Committee of the Planters' Association of Malaya should be asked to enquire into the case, for, if an outside tender for the shop was accepted, it would merely mean

a continuance of the present abuses, the Estate Manager not being in a position to control either the consumption or the quality of the toddy.

"I enclose correspondence between Dunedin Estate and the Chairman, Licensing Board, and would be obliged if you would kindly enquire into this case.

"Yours faithfully,

"(Sd.) C. R. FERRERS,

"Hon. Secretary, K.D.P.A.

"THE STANDING COMMITTEE,

"PLANTERS' ASSOCIATION OF MALAYA."

"DUNEDIN ESTATE,

"KAJANG.

"29th July, 1917.

SIR,

"As this estate is situated some four miles from the nearest toddy-shop, I have the honour to request that Karuppiah Pillai, the toddy-shop proprietor at the 16th mile, Kajang, be allowed to supply up to 100 bottles of toddy per day to this estate.

"I would then open a small toddy store on the estate, and employ a special man to supply toddy to the estate coolies at market rates.

"I would much prefer that I have my own shop than that Karuppiah Pillai open a branch shop on Dunedin. In the former case, I would be able to control the sale of toddy, and be sure that sick coolies were not given toddy.

"At present the coolies go to Semenyih for their toddy. This is very unsatisfactory as I have no control over the amount of toddy they drink.

"I have, etc.,

"P. R. PINHORN,

"Manager.

"THE CHAIRMAN,

"LICENSING BOARD,

"KUALA LUMPUR."

"KUALA LUMPUR,

"14th September, 1917.

"No. 4 in P. of C.L.B. 66/17.

"SIR,

"With reference to the proposal that a licensed toddy-shop should be opened on your estate, I have the honour to inform you that at a meeting of the Licensing Board held on 12th September, it was decided to recommend that tenders be called for the right of opening a shop there next year.

"2. I would add that even if tenders are called for it does not follow that any one of them will be accepted.

"I have, etc.,

"(Sd.) L. H. CLAYTON,

"Chairman, Licensing Board,

"Kuala Lumpur and Ulu Langat, K.L.

"THE MANAGER,

"DUNEDIN ESTATE,

"KAJANG."

Mr. KINDERSLEY points out that Mr. J. W. Kennedy had kindly sent them a copy of his report to the District Officer, Parit Buntar, on the working of the toddy-shop on Gula Estate, which report had already been printed and added as an appendix to their last minutes. It was a very useful piece of evidence and one that went a long way towards solving the toddy problem. They had reason to believe that his methods have the approval of the Licensing Board at Parit Buntar and other employers of Tamil labour would do well to make applications for similar terms where they can procure coconut palms. He personally believed that the Licensing Boards would be inclined to give the estate shops an experimental trial where possible and if they proved a success it would doubtless be of great benefit to the Tamil cooly and indirectly to the employers. Public toddy-shops could not be done away with entirely, but they might be placed under strict supervision by Government Inspectors.

Mr. KENNEDY thinks what was required was drastic reform of the present system of granting toddy licences.

It would be hard to imagine a more pernicious system than the present one of calling for tenders and granting licences to irresponsible Klings, and as long as this system is adhered to, he doubted if the toddy traffic will ever be satisfactorily controlled even with an improvement in supervision.

The class of men who control these toddy-shops will find some means of defeating, at least to a certain extent, any supervision that may be placed over them.

He strongly advocated that they ask Government to abolish the present system altogether.

At their last meeting held in Kuala Lumpur about two months ago he had given details of an experiment he had carried out with a toddy-shop on the estate he represented. He saw that what he said on that occasion was included in the minutes of that meeting so that he need say little further with regard to this, except perhaps, that the results from running this toddy-shop under European supervision continue to be of the most satisfactory character, and he might add that he had found there were no evil results whatever from toddy drinking provided fresh wholesome toddy is supplied and that the sale of it is under responsible control.

He was strongly of opinion that if Government would consent to a system placing all estate toddy-shops under the direct control of Managers—subject of course to certain restrictions—that nothing further would be heard of the evils of toddy drinking.

At a meeting of his Association held about three weeks ago the subject of toddy control had been very fully discussed, and a resolution arrived at which he would submit to them for their consideration to-day. The District Officer of Krian who had taken a keen interest in this question and who was also chairman of the Licensing Board had attended the meeting, and when invited to give his views on the problem of toddy control, he said, he could not of course speak for Government but so far as the Licensing Board was concerned they were unanimously in favour of the policy enunciated in the resolution.

The Board, he said, were strongly pressing these views on Government, and they had also sent copies of a letter to other Boards asking for sympathetic consideration of the matter.

He stated the Board were anxious to extend the granting of licences to estate Managers willing to adopt the scheme which he had tried and had found to work so successfully.

This was, he thought, satisfactory coming as it did from a Government Official and Chairman of a Licensing Board.

As the health and discipline of the Tamil labour force of the country was so much at stake over the question of toddy consumption and control he thought they ought now to take definite action and ask Government to abolish the present objectionable and injurious system altogether and to place the sale of toddy in more dependable and responsible hands than was the case at present.

Mr. RITCHIE seconds the resolutions of the Malay Peninsula Agricultural Association as moved by Mr. Kennedy and would again point out to the undue proportion of profit extorted by Government out of the cooly by way of toddy excise.

Mr. BUYERS cannot agree that cheap toddy was a desideratum, as his own experience had proved to him, when running the estate toddy-shop, that as soon as the price of toddy had been decreased drunkenness had increased. He had tried to reduce the price to 10 cents per bottle, but such cheapening had been followed immediately by a great prevalence of drunkenness which had substantially diminished on his raising the price to 15 cents.

Mr. PINHORN deals with the case submitted by the Kajang District Planters' Association. All he had asked was the right to buy his toddy in bulk and to retail it without profit, but the Chairman of the Licensing Board would not allow him to do this, but was probably going to call for tenders for a toddy-shop on his estate, which was obviously the last thing he wanted and the very worst thing that could happen in the interests of the cooly and himself.

Mr. MOOIJAART regrets that Government did not see fit even to give reasons for turning down the proposals put forward by the last meeting. As regards the experiment made by Mr. Kennedy, they all must feel grateful to him for this and he thoroughly

associated himself with all that Mr. Kennedy had said, except in one point. He disagreed with the suggestion of creating a Government monopoly of all wayside toddy-shops. Let the estates have their own toddy-shops by all means, but where this was not possible outside toddy-shops must remain. He asks what guarantee they had that the Government would run the shops more satisfactorily than private individuals. He submits that there was no cause whatever to inspire them with such unbounded confidence in a Government department. It seemed to him evident that as regards wayside shops, all that was needed was greater supervision and this would immediately give an idea as to what was a fair rent to charge, and on the other hand, it would gradually but surely eliminate undesirables as licensees.

Mr. KINDERSLEY thinks that the whole crux of the matter lay in the abolition of the tender system. Once that was done they would have gone a long way to better the conditions of their labour forces. The case brought forward by Mr. Pinhorn was a good instance of the absurdity of the present position, but he thinks that they would get most by asking one thing at a time and would therefore urge them to leave wayside shops alone for the time and ask for the elimination of the tender system on estates first of all such as was proposed by Mr. Kennedy.

Mr. GRAY says that he was himself on a Licensing Board and he would like the Association to find out whether it was a fact that Government was actually discouraging the practice of estate Managers being given licences.

Mr. STRIVENS informs the meeting that the Colonial Government had already replied to the representations made by them on the subject—*viz.*, that the matter was under consideration, which seemed hopeful.

Mr. MENZIES feels that this Government had hung up the matter too long already and that therefore if their attitude did not change soon the best plan would be to refer the whole matter to the Rubber Growers' Association.

Mr. KENNEDY then formally moves the following resolution, which is seconded by Mr. Ritchie and carried unanimously :

"That this Association views with considerable apprehension the continuance of the system of calling for tenders for toddy-shops licences. Also it considers it extremely undesirable that the toddy traffic of the whole country should continue to be under the entire control of Tamils as at present.

"It strongly urges the necessity for more responsible control and suggests that every estate should be encouraged to establish a toddy-shop of its own, if possible, so that there would be no inducement for coolies to leave their own estate and visit toddy-shops on the public road.

"To obtain efficient and reliable control of the Association is strongly of opinion that these shops should be placed under the entire control of the Manager of each estate, on the following conditions :

"That Government take a fair percentage of the gross sales as rental.

"That all profits from the sale of toddy be expended for the benefit of the labour force.

"That separate accounts be kept so that all transactions may be clearly shown and that these be open to inspection by Government officials at all times.

"It is urged that, if toddy-shop licences were granted on these conditions that private profiteering would be entirely eliminated, that the most efficient control would be effected, and that the agricultural labour force of the country would benefit to no inconsiderable extent by the change of system recommended.

"That pending a decision, all licences for 1918 be granted from quarter to quarter only.

"That the above resolutions be forwarded to the Governments of the Federated Malay States, Straits Settlements and Kedah."

6.—RAILWAY LIABILITY.

The Secretary reports the receipt of the following letter :

"KUALA LUMPUR,

"7th July, 1917.

"No. 3073/17.

"SIR,

"With reference to your letter of the 5th July, 1917, on the subject of the issue by the Railway Department of receipts at small stations for rubber delivered for despatch, I am directed to inform you that the General Manager, Federated Malay States Railways, is making arrangements for consignments of rubber to be accepted on and after the 1st September, 1917, if handed in at any time between 7 a.m. and 5 p.m. (Sundays and Christmas Day excepted), at the following railway stations :

Prai	Temoh
Bukit Mertajam	Tapah Road
Alor Star	Tanjong Malim
Nibong Tebal	Kuala Kubu
Parit Buntar	Kuala Kangsar
Bagan Serai	Rasa
Taiping	Serendah
Sungei Siput	Rawang
Chemor	Kuang
Tanjong Rambutan	Batu Tiga
Lahat Town	Kapar
Siputeh	Kuala Selangor
Tronoh	Gemas
Batu Gajah	Bahau
Kampar	Batu Anam

"2. I am to request that you will be so good as to forward a statement showing at what other small stations (if any) serious inconvenience is caused to estates by the Railway Department declining to store rubber thereat for the night.

"On receipt of this information, the question of providing for the safeguarding of rubber at such stations will receive consideration.

"3. I am to ask that estate Managers may be requested to continue to make every effort to deliver rubber at railway stations in time for its despatch by train on the day of delivery at the station, in order that the risk of keeping rubber over-night at wayside stations may be minimised.

"I have, etc.,

"(Sd.) W. MACKRAY,

"for Under Secretary to Government, F.M.S.

"THE SECRETARY,

"PLANTERS' ASSOCIATION OF MALAYA,

"KUALA LUMPUR."

He further reports that under instructions by the Standing Committee, copy of this letter had been forwarded to all Constituent Associations. In reply the following 14 additional stations had been suggested—*viz.*:

Jeram	Trolak
Assam Jawa	Padang Jawa
Teluk Piah	Labis
Ulu Yam	Petaling
Sungei Choh	Kepong
Bidor	Siliau
Sungkai	Mambau

The Secretary is instructed to reply to the Government accordingly, thanking them for their letter and suggesting the addition of the 14 stations named.

7.—PLANT DISEASES.

The SECRETARY submits the following correspondence:

"KUALA LUMPUR,

"7th September, 1917.

"SIR,

"I have the honour to acknowledge receipt of your letter 5344 of the 10th of July which was duly considered at a general meeting of my Association held on the 29th ultimo.

"In reply, I was instructed to point out that in the opinion of my Association mere *assistance* by the Federated Malay States Department of Agriculture is insufficient to assure plant diseases and pests, which are notoriously on the increase, being dealt with systematically and that it appears to the association to be essential, however short of men the department may be at the present, that *control* of the Federated Malay States Department should be extended beyond the Federated Malay States to all Colonial possessions and States under British protection in the Peninsula.

"I have, etc.,

"(Sd.) H. C. E. ZACHARIAS,

"Secretary.

"THE HONOURABLE.

"THE COLONIAL SECRETARY, S.S.,

"SINGAPORE."

"SINGAPORE,

"11th September, 1917.

"No. 3344/17.

"SIR,

"I am directed to acknowledge receipt of your letter of the 7th instant.

"2. The proposal put forward would appear to be that the officers of the Federated Malay States Agricultural Department—or certain of them—should be vested with statutory powers in the Colony, and should be allotted certain duties in the matter of preventing, detecting and curing plant diseases.

"3. If this is so, the Government of the Straits Settlements will welcome any specific and detailed suggestions as to the method by which this proposal could be carried into practical effect at the present time. It is hardly possible to address the Federated Malay States Government on the subject until the powers and duties which it is proposed to assign to its officers can be more or less definitely stated, and it is improbable that Government would receive with favour at present any suggestion which would entail any very large addition to the duties which its depleted staff of officers has to perform.

"4. With regard to the Unfederated States, I am to suggest that any representations which your Association desires to make should be addressed to the Secretary to the High Commissioner.

"I have, etc.,

"(Sd.) R. CRICHTON,

"for Colonial Secretary, S.S.

"THE SECRETARY,

"PLANTERS' ASSOCIATION OF MALAYA,

"KUALA LUMPUR."

"ALOR STAR, KEDAH,

"1st September, 1917.

"No. 2548/35. "

"SIR,

"With reference to your letter of the 5th July regarding the control of plant diseases in Kedah, I have the honour to inform you that the Chief Agricultural Inspector, Federated Malay States, is visiting Kedah about the 9th instant, mainly with a view to examining representative native rubber holdings and will no doubt report as to the measures that should be taken to prevent the spread of disease.

"I have, etc.,

"(Sd.) G. A. HALL,

"Acting Adviser to the Kedah Government.

"THE SECRETARY,

"PLANTERS' ASSOCIATION OF MALAYA,

"KUALA LUMPUR."

Mr. RITCHIE recognizes that the Federated Malay States Government would naturally object to any proposal entailing serious addition to the work of the Agricultural Department, but hopes that the adoption of such parts of the following scheme as are now possible, would place the department in a better position to deal with any serious epidemic disease which might appear without having this effect.

The scheme would *eventually* require :

- (a) An Enactment by the Colony on the lines of "The Federated Malay States Agricultural Pests Enactment, 1913." (? Provision Representation Supervising Committee);
- (b) The appointment of an Inspector, or Field Mycologist, for each settlement;
- (c) The training and appointment of an adequate subordinate staff to work under such Inspectors.

Of these, (b) is at present impossible, but there appears no reason why (a) and (c) should not at once be effected.

If this were done it would enable the Agricultural Department :

- (1) To deal promptly and effectively with a serious outbreak of disease. (At present impossible if such were to appear on the boundaries between Federated Malay States and Straits Settlements.)
- (2) To proceed without delay to the appointment of Inspectors as available, since the machinery necessary to make their work effective would be ready.

It is suggested that the following temporary arrangements could be made by which the districts of the Inspectors to be appointed in the future should be placed under the control of the present staff.

- 1. *Malacca*.—Under control of the Assistant Agricultural Inspector now resident in Seremban.
- 2. *Province Wellesley and the Dindings*.—Under the control of the Inspector stationed in Perak. (At certain times in the year the Agricultural Inspector at Parit Buntar could also assist this officer.)
- 3. *Singapore*.—It is suggested that any visits of inspection necessary might, if the consent of the Johore Government could be obtained, be paid by the officer recently stationed in Johore Bahru.

The above suggestions have reference to the Straits Settlements only, but it is hoped that such a scheme if adopted would be extended to Kedah and eventually to other States. The concurrence of the Straits Settlements Government would of course greatly facilitate this.

The scheme also deals with one only of the activities of the Agricultural Department—*viz.*, the treatment of pests and diseases.

This Association is, however, strongly of opinion that a general affiliation or unification into one department of Government agricultural work of all kinds within the Peninsula should be aimed at and it trusts that the measures suggested would be a step in this direction.

Mr. KENNEDY says there is no subject connected with the rubber industry that is agitating the minds of planters more at the present time than that of the menace of disease.

While there is no reason to become panicky over the subject of diseases he thinks there is just cause for alarm at the recent rapid increase of bark diseases that has taken place in this country.

The problem of disease, was, he thought, likely to develop into a very serious one, and if ultimate disaster was to be avoided something must be done to improve the present lack of organization against a danger that might well threaten the very existence of the whole industry.

He knew that some planters did not take a serious view of the bark diseases that had appeared recently, and they said "Oh! we shall master these diseases as we had mastered others," quite so, and he hoped they may, but they could not get away from the fact that diseases were steadily increasing and they did not know how soon they may be called upon to face new diseases far more serious than any they had yet encountered. If they admitted this possibility, then he thought it their duty as guardians of interests amounting to many millions sterling to do everything in their power to safeguard this enormous and all important industry from such a disaster as the trees being wiped out say by an epidemic of disease.

At the present time there was a deplorable lack of Governmental control over diseases in some States in the Peninsula and in fact it may be said that outside the Federated Malay States there was no Governmental control whatever, and even in the Federated Malay States present control was insufficient for the needs of the times.

It seemed to him that to safeguard the industry from possible disaster that the most efficient and complete co-operation between the different Governments of the Peninsula was vitally necessary.

He thought that the time had now come when the question of organizing a special department to control rubber diseases throughout the whole Peninsula might well be discussed.

Larger scientific staffs were of course essential if complete control is to be effected but, unfortunately, little could be done he was afraid in the way of increasing staffs until after the war. However, it did not follow that because they were unable to increase the European scientific staffs until after the war that things must be allowed to take their own course, so that the question was not what they could do after the war, but what they ought to be doing now. One of the greatest dangers to be feared at present was he thought from native holdings and more drastic legislation was required to deal with natives and others who neglect to take curative or preventive measures against disease.

For some time back a great deal had appeared in the Press and otherwise relative to such diseases, as "black-thread," "bark canker" and "brown bast" and the conflicting opinions expressed on these diseases by scientists and planters alike left one at times in a state of utter bewilderment. As these diseases were spreading rapidly, it seemed very necessary that uniform preventive measures for these bark diseases should be arrived at with as little delay as possible and that such measures should be universally adopted. If this object was to be attained then the closest co-operation between scientists themselves and also between scientists and planters was essential. He thought that the whole question of disease and control had become so vitally important and comprehensive that it was impossible to arrive at a satisfactory solution of the problem at their ordinary meetings, he therefore suggested that the time was opportune for scientists and planters of this country to hold a specially organized Conference on rubber diseases and their future control. He suggested that such a Conference be held under the direction of this Association and that all matters that might tend to solve the problem that confronted them be brought up and fully discussed. The holding of a Conference may appear to some as unnecessary and savouring of panic but, if they considered the great responsibilities that rested with them as planters in safeguarding the industry from possible disaster from disease, also the enormous amount of capital invested in the industry such a Conference would really be a very small thing indeed compared with the interests involved. He thought it also must be admitted that at present they had no organization to meet successfully a serious outbreak of disease if it appeared simultaneously throughout the different States of the Peninsula and he thought that the importance and vastness of the industry demanded that it be protected against all possibility of disaster from this source.

In any case, preparation never harmed anyone, and directors and shareholders would not blame them for taking due precautions against what was undoubtedly a menace to the whole industry.

If, on the other hand, they failed to recognize the grave danger that confronted them and through lack of foresight or initiative on their part the industry suffered, then their position would not be an enviable one.

He thought that while the holding of a Conference with a view to obtain a comprehensive exchange of views on diseases and control could do no possible harm it might well be productive of a vast amount of good.

Mr. KINDERSLEY rules that the question of a Conference would be considered separately.

Mr. MOOIJART seconds Mr. Ritchie's proposal on the lines of which the Secretary should be instructed to reply to the Colonial Secretary.

Mr. TAYLER enquires whether pink disease was not the only notifiable fungoid disease.

Mr. STIRRUP says that hitherto the only work done by the Agricultural Inspector in Johore had been locust work. He had however now been released from that work and been placed centrally

at Johore Bahru. He would add that his first business was to train subordinates and in this he was actively engaged. In the meantime, although he could not be everywhere, he would be glad if Managers would notify him of any bad cases in their neighbourhood, and if they required his advice for themselves he would also be very glad to be of what assistance he could.

As regards the question just asked, pink disease was in the Federated Malay States so far the only notifiable fungoid disease.

Mr. Ritchie's proposal is then put to the meeting and carried unanimously.

8.—AGRICULTURAL CONFERENCE.

Mr. KINDERSLEY intimates that he would now take Mr. Kennedy's proposal *re* the holding of a Conference.

Mr. KENNEDY moves the following resolution :

"That this Association views with some alarm the increasing number of bark diseases and as these diseases are likely to prove a very serious problem to the rubber industry, the Association is of opinion that the closest co-operation between Government, scientists and planters is vitally necessary, if the problem of fighting diseases is to be satisfactorily solved.

"The Association is of opinion that the time is opportune for scientists and planters of this country to hold a specially organized Conference on rubber diseases. It suggests that such a Conference be held under the direction of the Planters' Association of Malaya, that the Governmental scientific staffs, and the staffs of the different private research laboratories be invited to attend and that lectures and discussions be arranged.

"It is also suggested that one or more Mycologists from Sumatra and Ceylon be invited to attend the Conference so that the most comprehensive exchange of views on the more serious latter-day diseases may be obtained.

"The Association desires to express the opinion that such a Conference should be held with the least possible delay and that any matter that would assist in solving the problem of disease be brought up and discussed.

"It is suggested that the following might form subjects for discussion :

"(1) The necessity for closer co-operation between the different Governments of the Peninsula and Colony with regard to control of diseases, also the necessity of increasing the strength of scientific staffs as soon as circumstances permit.

"(2) The advisability of having one scientific department under the Federated Malay States Department of Agriculture to control diseases throughout the whole Peninsula and Colony.

"(3) The need for more drastic legislation with regard to owners of native holdings and others who neglect to take curative or preventive measures against disease.

"(4) As future plantings might to a certain extent be safeguarded against disease by the introduction of a fresh stock into the country, it is suggested that to gain this object planters co-operate with Government to obtain supplies of healthy seed from the Amazon."

Mr. TAYLER seconds the proposal.

Mr. RITCHIE is afraid that there is a good deal of ignorance of the subject on the part of scientists no less than that of planters. He therefore hardly thinks that a Conference would do much good until the scientists themselves have made up their own minds.

Mr. MOOLJAART reminds the proposer that an Agricultural Conference was already decided upon early next year, that it took a great deal of time to organize such a Conference properly and that the two would undoubtedly clash.

Mr. McCULLOCH agrees that it would be desirable to combine the two Conferences.

Mr. KENNEDY is prepared to agree to this proposal, provided the Planters' Association of Malaya delegates were instructed to press for sufficient time being given to the subject of plant diseases at the next Agricultural Conference; that at least one scientist each from Ceylon, Southern India, Sumatra and Java be invited to attend, and that, if necessary, their expenses be paid by the Planters' Association of Malaya.

This is agreed to.

The SECRETARY reports the appointment of the following further delegates to the Agricultural Conference to be held next spring—*viz.*:

Mr. Thos. H. Menzies	...	...	Kuala Selangor
" P. R. Pinhorn	...	...	Kajang
" P. J. A. Williams	...	...	Central Pahang
" F. G. Harvey	...	...	Kuala Lumpur
" R. Napier Hendrie	...	...	Klang
" D. A. Ross	...	...	Johore
" V. A. Tayler	...	...	Nagri Sembilan

9.—HOSPITALS.

The SECRETARY reports that the matter had been considered by the Standing Committee who had instructed him to write as follows:

"KUALA LUMPUR,

"15th September, 1917.

"Sir,

"I have the honour to acknowledge receipt of your letter 3578 of the 14th August. This has been duly considered by my Association, the members of which, however, do not feel in a position to express an opinion pending further details of the scheme proposed for the taking over of estate hospitals and dispensaries by Government.

"I am also instructed to ask for a definition of the term 'qualified man in charge of an hospital' as used by the Government of Madras.

"I have, etc.,

"(Sd.) H. C. E. ZACHARIAS,

"*Secretary.*

"UNDER SECRETARY,

"FEDERATED MALAY STATES,

"KUALA LUMPUR."

As regards the European hospitals, the Standing Committee had found themselves in complete agreement with the opinion expressed at the last meeting, but they rather doubted that at a time when neither material nor personnel was available the moment was opportune for asking the Government something which they at the time knew could not be obtained.

Mr. MOOIJART is inclined to disagree with the view of the Standing Committee. However unobtainable medical men might be at the time, that was no reason why they should not draw up a scheme for reorganization of their whole Medical and Health Departments on the lines of the Indian Medical Service. Immediately after the war was over, medical men would be available, but it was certain that within 18 months they would all have become absorbed and that for years to come there would be no further supplies. It would naturally take a long time to draw up such a scheme, but he believes that the Government quite realized the necessity and it therefore seemed to him that now was the opportune time for asking the Government to take such a step.

Mr. RITCHIE agrees with Mr. Mooijaart's contention which was sound enough, but if they went to Government they surely must have a clear and definite proposal. As this at the time was lacking, he suggests that the matter be referred back to the Standing Committee with instructions to place a definite proposal before the next meeting.

Agreed to.

10.—MALARIA PREVENTION.

Mr. McCULLOCH reports that the Standing Committee had been considering the matter very carefully, but although they were unanimous that the Enactment in its present form was unacceptable they had not yet been able to formulate their views and he therefore suggests that the matter stand over until the next meeting by which time the Standing Committee would submit their memorandum.

Mr. KINDERSLEY agrees but would like to take the opportunity of clearing up some misunderstanding with regard to the passing of the Enactment, as an impression existed that the Government rushed it through. This was not the case. His Excellency the High Commissioner remarked at the time that, if it was the wish of the Council that the Bill should be deferred, he had no objection to that course being taken. On the matter being put to the vote three unofficials voted for the Bill being gone on with and two against.

11.—STATISTICAL BUREAU.

The SECRETARY reads the following correspondence:

“ KUALA LUMPUR,
“ 7th September, 1917.

“ SIR,

“ I have the honour to inform you that the question of a Statistical Bureau was considered at the last meeting of this Association held on the 29th ulto., when I was instructed to inform you that this Association unanimously endorses the necessity of forming such a department for the whole of British Malaya, as has been urged by the Federated Malay States Chamber of Commerce and by the Hon'ble Mr. W. F. Nutt and R. C. M. Kindersley at the recent Federal Council held at Kuala Kangsar.

“ I have, etc.,

“ (Sd.) H. C. E. ZACHARIAS,
“ Secretary.

“ UNDER SECRETARY,

“ FEDERATED MALAY STATES,
“ KUALA LUMPUR.”

“ KUALA LUMPUR,
“ 19th September, 1917.

“ No. 4016/17.

“ SIR,

“ I am directed to acknowledge receipt of your letter dated the 7th September, 1917, regarding the establishment of a Statistical Bureau for British Malaya, and to inform you that the matter is at present under consideration.

“ I have, etc.,

“ (Sd.) H. FRASER,
“ for Under Secretary to Government, F.M.S.

“ THE SECRETARY,

“ PLANTERS' ASSOCIATION OF MALAYA,
“ KUALA LUMPUR.”

12.—SILT CONTROL.

The SECRETARY reads the following letter:

“ KUALA LUMPUR,
“ 7th September, 1917.

“ No. 1138/17.

“ SIR,

“ I am directed by the Chief Secretary to forward a copy of a bill which it is proposed to introduce in the Federal Council in order to provide means for the protection of lands from the inroad of silt

and other matter. The Chief Secretary would be glad to receive any comments which your Association may have to make upon this measure.

"I have, etc.,

"(Sd.) A. CALDECOTT,

"for Under Secretary to Government, F.M.S.

"THE SECRETARY,

"PLANTERS' ASSOCIATION OF MALAYA,

"KUALA LUMPUR."

Mr. KINDERSLEY says it was his opinion that the silting from rubber estates could be entirely prevented by a system of catchment drains or pits.

This had first been suggested to him by Mr. Sidney Morgan, who had seen the method tried in Perak, about three years ago and he had since carried out experiments on several estates. His first experiments had been a partial failure as the drains were not sufficiently large or sufficiently numerous.

He was now satisfied that silt could be prevented on any average hill land if, approximately, 200 drains per acre, 15 feet long by $1\frac{1}{2}$ feet wide by $1\frac{1}{2}$ feet deep, were put in properly placed. These could be cut for 12 cents each or, approximately, \$24 per acre.

Perhaps it was hardly necessary to say that by the prevention of silt from the commencement the top soil was kept on the land, instead of being carried down to the stream beds and hollows and the water was also retained on the land. Naturally the work must be carried out with regard to the conditions on each piece of land--"on very steep land the drains would be closer and deeper. The overlapping of the drains so that no water channels can form was a necessary point to observe.

Fewer or smaller drains than he had indicated would probably result in failure as they would fill up and break away.

An illustration of the general idea is as follows:

"Allow that you have an even slope on the side of a hill with rubber trees planted 20 feet by 20 feet running straight up and down the slope. Cut a drain as previously described above each tree say 5 feet above the tree, thus cutting 100 drains per acre. Then cut a locking drain parallel to the others between every four drains which would double the number and give you 200 to the acre completely overlapping each other."

He gave these details as they might be of use to members and felt sure if carefully carried out there would be nothing to fear from the Silt Enactment.

Mr. McCULLOCH would like to thank the Government for having submitted the draft Enactment and hopes that similar

procedure would be followed by them in respect of all legislation affecting the planter. There were three points on which he thinks the Bill could and should be improved :

Section 6.—That provision be made giving an owner against whom an order is issued, the option to purchase the land being damaged, at a reasonable valuation.

Reason.—The initial cost of a silt retaining dam or even the annual upkeep of same, might greatly exceed the total value of the land being damaged.

Section 9, sub-section (i).—That provision be made for appeal to some Court or duly constituted Rural Board.

Reason.—A Resident is liable to make an error of judgment. Protection, in the form of right to appeal, is the more necessary as under the proposed Enactment the Resident will fill the position of both prosecution and Judge.

Section 9, sub-section (ii).—That where the State land being damaged is a road, and the protection required will in effect amount to the increasing of the road reserve by the abandoning of cultivation on a portion of alienated land abutting on same, that the land to be so abandoned be resumed by Government, the owner being compensated.

Reason.—The road reserve in many hilly districts is not sufficiently wide for the efficient protection of the roads from natural silt. It would be unfair that an owner, for the benefit of the State, should be debarred from or compelled to abandon the proper cultivation of his land, without compensation.

He moves that Mr. Kindersley be asked to be good enough to move these amendments at the next Federal Council Meeting.

Mr. TAYLER seconds Mr. McCulloch's proposal and would add that as the Resident theoretically decides what steps should be taken this in practice would mean that the Resident would be advised by the Public Works Department who obviously were not the best experts in a matter of this nature.

The proposal is agreed to and Mr. Kindersley expresses his pleasure to comply with their request.

13.—SMALL COINS.

The SECRETARY reports that the shortage of subsidiary coins had been considered by the Standing Committee, under whose instruction he had written the following letter :

“ KUALA LUMPUR,

“ 14th September, 1917.

“ SIR,

“ I have been instructed by the Standing Committee of this Association to point out to you the necessity of alleviating immediately the existing shortage in small coins. The situation in the Federated Malay States is becoming a very serious one and my

Committee, therefore, is unanimously of the opinion that, whatever ultimate remedial measures may be taken by the Currency Commissioners, something is needed at once to prevent a very serious panic and general disturbance.

"My Committee would therefore urge the immediate issue of 10-cent notes to be printed at the local Survey Department, which, judging from its production of the Federated Malay States War Loan Bonds, is perfectly capable of turning out such provisional notes. If my Committee's suggestion is adopted, it is further recommended that these notes be issued in the form of similar Greek notes—*i.e.*, in rolls and perforated for easy detachment.

"My Committee considers that it would be inadvisable to issue more than one denomination of these small notes and they recommend 10-cent notes as, the lower the denomination, the less the danger of counterfeiting. Moreover, with notes for 10 cents and the existing supply of copper coins my Committee considers that all the needs of the country could easily be satisfied.

"I have, etc.,

"(Sd.) H. C. E. ZACHARIAS,

"*Secretary.*

"THE HON'BLE

"MR. H. N. MARRIOTT,

"SINGAPORE."

"THE TREASURY,

"SINGAPORE,

"18th September, 1917.

"SUBSIDIARY SILVER COMMISSION.

"SIR,

"I am directed to acknowledge with thanks receipt of your letter of the 14th instant and to say that it has been laid before the Commission.

"I have, etc.,

"(Sd.) J. H. PEDLOW,

"*Secretary to the Commission.*

"THE SECRETARY,

"PLANTERS' ASSOCIATION OF MALAYA,

"KUALA LUMPUR."

As they were aware the Government had since taken steps to ease the shortage of subsidiary coins (*vide* the *Federated Malay States Government Gazette* of October 17th of 1917).

14.—FOOD SUPPLY.

The SECRETARY submits the following letters received from the Batu Tiga and Kajang District Planters' Association, respectively :

"BATU TIGA,
"19th October, 1917.

"DEAR SIR,

"At a meeting of this Association held on Wednesday, 17th instant, I was instructed to write you with reference to item 13 on your agenda—Cause of enhanced prices of food-stuffs as follows :

"This Association strongly favours any proposal to Government whereby the price of food-stuffs can be controlled and that immediate action be taken.

"Yours faithfully,
"(Sd.) T. J. CUMMING,
"Hon. Secretary.

"THE SECRETARY,
"PLANTERS' ASSOCIATION OF MALAYA,
"KUALA LUMPUR."

"KAJANG,
"24th September, 1917.

"DEAR SIR,

"The following is an extract from the minutes of a meeting of the Kajang District Planters' Association, 18th September, 1917 :

"5. *Planting of Fruit Trees.*—The Chairman said he considered that planters should plant permanent fruit trees and vegetables both for themselves and for their labour forces. The Malayan fruit supply would rapidly come to an end unless some serious action was taken. To remedy the decline in the fruit supply, he said that Government should insist that all Malay holdings given out for the cultivation of fruit trees should be devoted to fruit trees only and that in cases where rubber had been planted the holders should be compelled to cut out sufficient rubber to allow the proper growth of the fruit trees, etc., stipulated in their grant. If this action were taken by Government it would be for the planters to assist also and he suggested that all estates should plant up with fruit trees and vegetables one-half per cent. of their total acreage. The Chairman then proposed that the Planters' Association of Malaya be asked to approach the Government on the question of the preservation of the fruit supply of the country. This was seconded by the Hon. Secretary and carried unanimously.

"7. *Food Prices.*—Mr. Pinhorn said that he had gone into the question of prices of food-stuffs at Semenyih, Bangi and Kajang and that there was no great discrepancy between these towns, Siam rice in particular had risen from about 34 cents to 50 and 52 cents per gantang. The cause of several increases in prices could be traced to the high cost of rice. He gave an instance of a man in his employment asking for higher wages because "ikan-kring" had risen from 15 to 35 cents; the seller of "ikan-kring" said he had to raise his price because of the higher cost of rice and so on (laughter).

"Mr. Pinhorn said that Messrs. Boustead Hampshire were enquiring from the Siamese exporters the reason for the rice in price.

"Mr. Leyne stated that the cost of shipping was the real cause and that the small dealers were not overcharging. The Chairman said that a Special Committee was now going into the question of prices of food-stuffs.

"Mr. Pinhorn proposed that the Planters' Association of Malaya be asked to enquire into the cause of the greatly enhanced prices of food-stuffs and in particular of Siam rice. Seconded by Mr. Dakeyne and carried.

"I should be obliged if you would place upon the agenda of the next Planters' Association of Malaya Meeting

1. Preservation of the Malayan fruit supply.
2. Cause of enhanced price of food-stuffs (in particular Siam rice).

"Yours faithfully,

"(Sd). C. R. FERRERS,

"Hon. Secretary.

"THE SECRETARY,

"PLANTERS' ASSOCIATION OF MALAYA."

Mr. KINDERSLEY is sure that everybody must agree that fruit trees should not be cut down to give place to rubber; and in his opinion it would be a good plan that land when alienated should be made subject to a condition that part of it should be cultivated with products other than rubber.

As regards the high price of rice, the high cost of shipping was no doubt generally responsible for this.

Mr. BRADBERRY thinks that before any action was taken all Constituent Associations should be circularized and asked for an expression of opinion.

Mr. TAYLER considers that the high price of rice was due to profiteering. What steps had Government taken to ascertain the cause of shortage of rice, when Burma and Siam reported a plentiful harvest? The Government had circularized estates and asked them to plant vegetables. Nobody had suggested that there was any shortage in vegetables nor could vegetables ever take the place of rice. Most estates had no chance however of planting rice and he therefore thinks it was very premature for the Federated Malay States Government to send out a circular to all estates signed by the Chief Secretary, as the Chairman of the Food Control Committee (Gazetted on 27th July.)

He would therefore move that the Secretary be instructed to ask the Government what steps are being taken to control the supply and cost of rice in the country, in view of the circular sent to all estates in the Federated Malay States by the Committee of Food Control regarding local food production.

Mr. PINHORN seconds the proposal and adds that he had gone into the question exhaustively, but that as a matter of fact so far there had been great difficulty in comparing prices as the system of grading rice in Burma and Siam on the one hand and locally on the other was totally different.

Mr. MOOLJAART concurs with Mr. Tayler and believes that the rise in price was mostly due to a narrow ring of Penang rice dealers.

Mr. GRAY thinks that most of the Siam rice came down by "tongkang." As for the Government idea of estates growing rice, he would like to hear where the necessary labour was to come from.

Mr. RITCHIE, from personal experience, thinks that the price of vegetables even now is not sufficiently high to induce people to grow them even if offered land free for the purpose.

Mr. TAYLER's proposal is then put to the meeting and carried unanimously.

The meeting terminates at 1.30 p.m.

H. C. E. ZACHARIAS,
Secretary.

Abstract of Meteorological Readings in the various Districts of Malaya for the month of June, 1917.

District.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	TEMPERATURE.				HYGROMETER.				Prevailing Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Kelantan, Kota Bharu ...	...	144.0	82.7	91.53	73.33	18.20	76.9	.812	73.0	72.0	...	6.72	1.83
Pahang, Kuala Lipis ...	...	...	81.29	70.26	73.2	17.06	76.18	...	...	...	...	6.60	1.59
Johore, Johore Bahru ...	29.772	158.0	...	89.22	73.52	15.70	...	...	...	...	...	4.57	...
Singapore, Kandang Kerbau	29.773	147.5	83.7	87.4	75.2	12.2	78.5	.888	...	78.0	...	3.80	1.04
Malacca, Durian Daun	...	158.0	82.3	83.3	72.3	11.0	76.4	.966	...	87.4	...	6.35	3.07
Negri Sembilan, Seremban	...	153.1	78.6	89.9	71.5	18.4	75.3	.819	73.1	83.5	S.E.	5.85	1.70
" Kuala Pilah	...	141.3	82.2	90.0	73.6	16.4	79.5	.962	77.8	86.8	S.W.	6.49	1.57
" Port Dickson	...	126.7	82.7	87.9	73.8	14.1	77.7	.856	74.5	77.0	...	6.92	2.07
Selangor, Kuala Lumpur	29.778	142.4	81.7	89.9	73.7	16.2	76.9	.833	75.9	77.0	S.W.	7.37	3.96
" Klang	...	...	81.2	86.1	73.1	13.0	76.7	...	...	...	...	3.95	0.75
" Kuala Selangor	...	...	89.3	74.7	14.6	...	...	...	...	...	...	3.01	1.89
" Rawang	...	...	92.8	...	...	...	...	...	...	...	...	7.04	1.62
Perak, Telok Anson	...	...	82.87	93.0	70.0	23.0	78.44	.914	...	83.0	...	4.29	2.28
" Ipoh	...	...	83.11	94.0	70.0	24.0	77.09	.848	74.19	75.0	...	4.78	2.08
" Taiping	...	113.0	83.02	93.0	73.0	20.0	78.61	.920	...	83.0	...	3.77	1.73
" The Cottage	...	...	...	...	...	...	...	...	...	...	...	10.27	2.83
" Parit Buntar	...	...	84.05	94.0	71.0	23.0	78.76	.912	79.0	...	...	1.77	.67
Penang, Georgetown	29.747	145.26	82.2	91.1	73.6	17.5	77.3	.851	73.9	74.4	N.	5.43	2.95
Kedah, Alor Star	...	...	...	...	...	...	...	...	...	...	...	5.45	1.68
Perlis, Kangar ...	...	...	...	89.63	74.03	15.60	...	...	...	...	...	1.60	.56

